Who REALLY invented Morse Code?
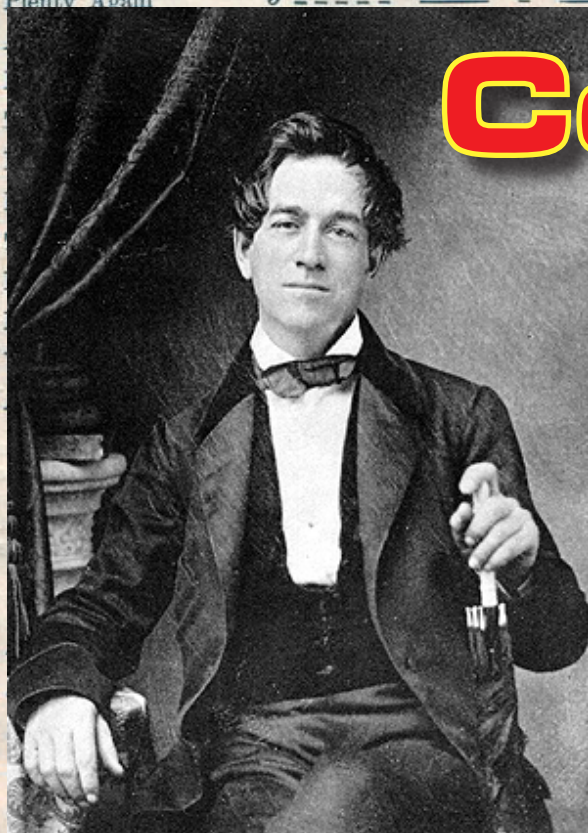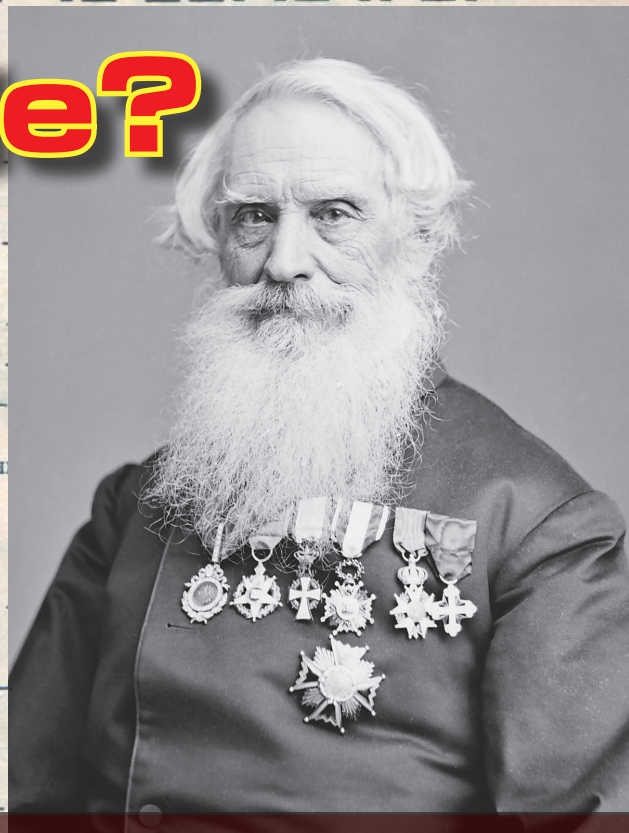
Also in this issue:
- Meet the KSM QSL Mistress
- Radio France International
- Spy Numbers Intrigue
- MT Reviews the Perseus SDR

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09

The True History of Morse Code
By Gregory Smith

This is an account of the partnership between Samuel Morse and Alfred Vail and his family. Morse had the vision to see the potential for electricity to play a role in communications, and the concept of the telegraph was rightfully his. However, Vail's family provided much of the financial backing to bring the concept to fruition, while Vail provided much of the engineering and the labor.

More to the point, however, is the system of dots and dashes which make up what is commonly called "Morse Code." This method, as it was eventually used by telegraphers and by CW operators to this day, is almost entirely the invention of Alfred Vail.

CONTENTS

July 12, 1999, marked the day when coastal station KPH sent out the last commercial Morse code message from the United States. Dick Dillman was there to commemorate the heritage and tradition of commercial Morse stations and their operators: Denice Stoops was there to mourn the end of her career as the first female operator to be hired by KPH.

To their delight, Dillman and Stoops and many former operators are back at their positions, except now they are volunteering their time at common carrier coastal station KSM, preserving the equipment and tradition of KPH. If you log KSM when it's on air (you'll have to copy CW to get the ID), you'll get a QSL from Denice. If you call her the QSL Mistress in your reception report, you can be guaranteed a reply!

There's more than one way to skin a cat, and if Radio France won't broadcast to North America in English, there's lots of English and streaming audio on their website. And on your cell phone. And on your satellite receiver or your local FM station... Despite all these options, it feels like RFI, among many other broadcasters, is trying to force us to the internet for international broadcasts. No doubt you'd be right.
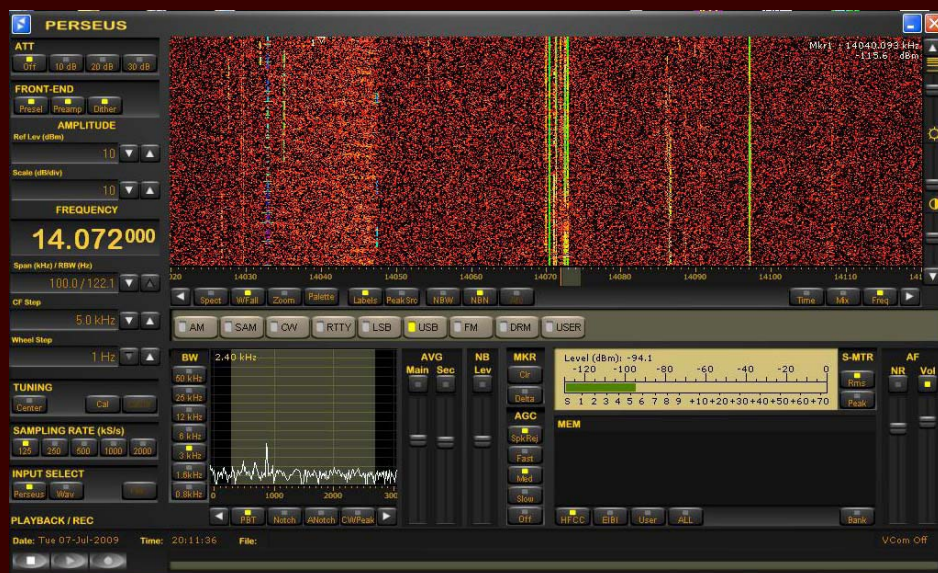
Reviews

We all know technology marches on, but if you get a chance to try out the Perseus software defined radio, you'll be shocked at how far forward technology leapt when you weren't looking! Couched in this tiny package is a blazingly fast, versatile receiver that is ready to provide a universe of listening possibilities.

With the Perseus' ability to record whole swaths of spectrum, you can keep listening to the same selection, each time "DXing" a different portion of the signal as if it were live. On the other hand, *Computers & Radio* reports on an amateur radio QSO that doesn't require a ham license or even any radio equipment at all!

Hamsphere takes place entirely over the internet, but it mimics the atmospheric conditions of shortwave and encourages the same operating procedures and etiquette as on-air operation. What better way to practice operation of your "receiver" and proper behavior with other "stations" from around the world?!

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LETTERS TO THE EDITOR

MT Express Expands Language Coverage!

We are delighted to announce that, beginning with this September issue, the pdf version of *Monitoring Times* (*"Monitoring Times Express"* or *MTX*, for short) will no longer be limited to English Language broadcasts only. Instead, the by-time frequency schedules will include ALL languages! This increases the number of records by two-thirds, since there are nearly twice as many non-English broadcasts as there are English.

Due to the cost of printing and postage, the printed magazine will *not* be picking up these additional schedules. Also, in order not to increase the file download size for our dial-up or overseas subscribers, the comprehensive, all-language guide will be offered as a separate download. In other words, using the September password, *MT Express* subscribers can access three files: a high-resolution version September issue, a lower-resolution issue, and the comprehensive Shortwave Guide pdf file – all for the same low price of $19.95!

We just recently learned of the current hiatus of *Passport to World Band Radio*. While we hope *PWBR* will return as an indispensable resource for radio listeners, the timing of *MT Express's* expanded language coverage couldn't be better for SWLs. Every month, updated frequencies and schedules will be available to you *at no additional cost!*

If you want to get in on this deal, but you're tied in to a print subscription, you can add *MTX* to your subscription for only $11, or you can call 1-800-438-8155 and ask the Order Desk to convert your print subscription to *MT Express.* Folks, this new feature is a resource you will find *nowhere else*, and it's yours for an entire year for the price of one moderately-priced dinner out!

"Passport to World Band Radio" in Limbo

Following is the press release issued by Larry Magne, and forwarded to us by many readers:

"As with any good recipe, a range of ingredients has to come together if a reference book is to succeed. Solid content is, of course, essential. But in recent months other considerations have had an increased bearing on the future of *Passport to World Band Radio®*.

"So it is that the 26th Edition of *Passport to World Band Radio®* is being held in limbo. Despite this, for now we are continuing to maintain the WorldScan® database and uphold all proprietary material. Among other things,

this should help allow for an orderly return to production, under IBS' aegis or otherwise, should conditions allow.

"For Passport® readers and our small team, alike, this is a seminal moment. After all, *Passport to World Band Radio®* goes back a quarter century and has had something like a million readers worldwide. But the future has its own rhythm that confounds prognostication. There may yet be more chapters to this story. Stay tuned."

Lawrence Magne, Publisher, Passport to World Band Radio
International Broadcasting Services, Ltd.
www.passband.com

We join with fans of *PWBR* around the world in hoping that "other considerations" are soon resolved in a way most beneficial to all. *PWBR*'s "blue pages" and trustworthy equipment reviews are valued by many thousands of radio listeners, and make *PWBR* an irreplaceable resource.

New Features Editor

As *MT*'s long-term Managing Editor, I am pleased to announce that, beginning next month, I will be handing off a large portion of my former duties to our new Features Editor, Ken Reitz, whose writing professionalism has graced the pages of *MT* for many years. If you've had an interest in writing a feature article for *Monitoring Times*, now is the time to send your article pitch to Ken at *kenreitz@monitoringtimes.com*. For feature article ideas and guidelines, go to **www.monitoringtimes.com/html/write_for_mt.html**

Technical projects and equipment or software review ideas should be sent to *larryvanhorn@monitoringtimes.com* or to me at *editor@monitoringtimes.com*

Farewell to John Catalano

We regret that this will be the final *Computers & Radios* column by John Catalano. As you probably gathered in last month's article on the evolution of netbook computers, John has been working on and writing about computers in *MT* and elsewhere for a very long time – since the October 1991 issue, in fact. Readers can only imagine the endless hours he put into testing radio-related software so you wouldn't have to suffer the same frustrations he did.

John, our hat is off to you: May you enjoy your well-deserved retirement from monthly deadlines and scouring the internet for new and exciting software packages.

MT readers take note: until further notice, finding and sharing software solutions is now

up to you! We invite your suggestions for useful radio-related software as well as the name of anyone you think might be a potential writer in this field.

Thanks for the Reviews

Reviews are much appreciated by fellow hobbyists. Just read the following representative comments:

"I appreciated reading the info about the Internet program 'ZIP-Signal' in John Catalano's June column. I am quite fortunate to have a fantastic low-power FM radio station just miles from my home. Ever since WRHX-LP appeared on the airwaves just a few years ago, I have wondered where its transmitting tower was located. After getting the geographic coordinates from ZIP-Signal, I plugged them into my old GPS unit (the type that has no maps in it; it just points you in the actual direction using an arrow). When the enjoyable search concluded, I had found the tower. It was well off the beaten path on a country road I had never noticed before! What a useful website Mr. Catalano taught us about!"

Judy May W1ORO
Union, Kentucky

"Thank you so much for your review of the BCD396XT in the June 2009 issue of *MT*. That article alone justified my subscription to *MT*!

"I have been trying to resolve a problem that I was having with my BCD396XT: Uniden has been of no help, but you had the answer in the 3rd paragraph, rightmost column, page 69 - 'There is no USAD programming software....' That was all I needed to know, but Uniden was unable to tell me that the current version would not work with the 396XT and there is no disclaimer to that fact on the Uniden website. I downloaded and installed 'FreeScan' and I was able to communicate with the scanner on the first try! Thanks again."

Paul Spurlock WA4FHY

Preserving Maritime Morse Code

We hope you enjoy this month's focus on the evolution of Morse Code and on its preservation at coast station KSM.

Last February we published a letter from Roger Parmenter, who wrote about the November 1988 story on defunct station WCC. Roger mentioned that when the station was closed, "All he did was to shut off the electricity, lock the door, and leave!" We received the following related letter from Bill Ruck:

"We note with interest Roger Parmenter's story about WCC in *Letters to the Editor, Monitoring Times*, February 2009.

"The last General Manager at KPH (and WCC), Jack Martini, did the same thing at the receiving station in Point Reyes, California (known as 'RS'). He turned off the lights and locked the doors but left the receivers monitoring the bands as they had done for the past 90 years. Jack is now a member of the Maritime Radio Historical Society.

"We are fortunate that the KPH facilities in Point Reyes and Bolinas (transmitter site) were given intact and operational to the Point Reyes

National Seashore, part of the National Park Service. And we are even more fortunate that the Point Reyes National Seashore allows the Maritime Radio Historical Society to operate that historic station honoring the men and women in the marine radio service."

Bill then reminds us of the annual "Night of Nights" in July when the MRHS commemorates the end of commercial Morse messages in the maritime service. "In that way we symbolically pick up the thread and carry on with the traditions of marine radiotelegraphy."

"More information about Night of Nights and the entire KPH project can be found at our website **www.radiomarine.org** "

Bill Ruck
Maritime Radio Historical Society

See this month's feature *Meet the QSL Mistress* for more on how to hear and QSL coast station KSM which uses the old KPH facilities.

Exploring Newer Modes

Dear Mike,

"I enjoyed the last part of *Digital Digest* in the July *MT* page 31. I have never used IRC Chat and thought I would give it a try. After getting the IRC Client set up and going to the IRC Channel #wunclub I saw nothing and was the only user there. I guess I was on a bad IRC Server.

"I changed to the starchat server and found plenty of people on the wunclub channel. I have not yet learned how to use the bot but have learned how to get the help file from it.

"This reminds me of when I first got interested in online services. At that time there was no internet. We basically had the choice of CompuServe, The Source, and Delphi at the time. On one of those services they had a chat section for short wave. It met on the last Saturday or Sunday of the week for about a few hours. It was more like a weekly ham net but on the computer. I think it even shut down after a certain time after the last person left, unlike the 24 hour IRC or other chat services today. You would log on and wait for a person to give out a frequency or event happening.

"I have found the IRC to be very interesting and fun so far and will explore it further. It's a bit of a change from using the regular chat services on the internet.

"Thanks for the info on IRC"

Mike Hoblinski, N6IMF

Hi Loyd,

"I wanted to say thanks for the excellent *GlobalNet* article on monitoring Ireland via Internet Radio (June 2009). Up to this point, I have done very little listening to online radio stations (too clinical and artificial-sounding to me), but with my Irish ancestry and high interest in Irish culture, I simply had to check it out!

"Thus far, I've only explored RTE Radio 1,
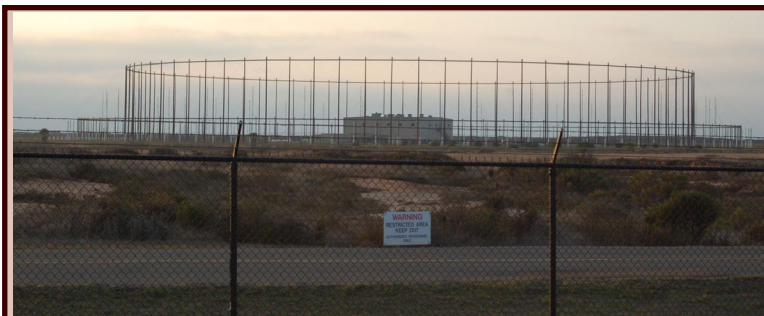
Where Am I?

Do you recognize this antenna? What is it and where is it? Send your answer to editor@monitoringtimes.com and if your name is selected from the right answer, we'll give you an additional 3 months of MT Express!

Do you have a photo of a recognizable or historic radio-related facility or antenna? Send in your photo for possible use in another *Where am I?* contest!

but from what heard there, I expect to go much further! Thanks again for putting this together – it may lead to more online monitoring for me."

Kevin "O'Hern" Carey

Airshow Kudos

"I'm an occasional monitor (mostly rail and air) and I just had to say what another great airshow monitoring guide you and *MT* put together for '09! It's really been helpful this morning as I cast about looking for Thunderbirds freqs for this weekend's show here in Helena, Mont. I also appreciate the show sked as well as the equipment list.

"Speaking of which, here's another Radio Shack PRO series receiver you can add to the 'discontinued but capable' list: the PRO-2045. It's a nice desktop model I bought awhile back. I had no trouble plugging in the needed freqs and switching modes as I assigned channels. For what I require, the 2045 is a nice radio."

Mike Harbour

On Baseball

Below 500 kHz columnist Kevin Carey recently wrote to Beginners Corner columnist Ken Reitz:

"....one small correction to your excellent June article on tuning in baseball on the radio. The Rochester Red Wings are now a minor league team of the Minnesota Twins rather than the Baltimore Orioles. This is a fairly recent change (last few seasons) after 40+ years with the Orioles. Nonetheless, it was nice to see our local team mentioned in the pages of MT."

Kevin went on to relate this interesting story:

"I've spent many nights at the Red Wings ball field, playing 'taxi' for my son so he can get autographs from players. Often, he's there an hour after the game ends, waiting for players to come out. One night, when my wife was there with him, he waited a very long time for an autograph from Trent Oeltjen and another teammate. They gave the autographs, but then looked around and realized their ride had left (the one that would take them to their apartment). My wife offered to assist, and ended up giving the players a 15-minute ride to their apartment complex. My son was star-struck, and it was all he could talk about for days!"

Bob, W8JHD

Get with MT Express!

We conclude with this testimonial for the benefits of *MT Express*, which was posted on the ScanFresno yahoo group. We hope "Fresno Bill" be even more pleased when he sees what else he's now getting with his *MTX* subscription! *(See opening story.)*

Hello ScanFresnoGroup,

"FWIW I no longer buy the paper copy of *MT* magazine. I spent $20.00 and signed up for *MT Express* over the internet. Don't have to travel to a book store hoping a copy of *MT* mag is still there. Now every month the new mag is waiting in my e-mail. I can get a low or high resolution copy, save, print, cut and paste articles etc.

"I thought I would miss holding a paper copy, I don't.

"A free sample of *MT Express* is available at their web site

"I really like the article on the museums along with the frequencies. [July cover feature by Bruce Ames.] Think I'll make a 4Th of July resolution and try and visit them all! Another good job, Bruce."

Fresno Bill

COMMUNICATIONS

by Ken Reitz

SHORTWAVE/AMATEUR RADIO

Two New HF Stations Granted

The FCC's International Bureau granted application to construct two new international shortwave broadcast stations. One, to George S. Mock (d/b/a/ Hill Radio International), is to be located in Milton, Florida, in the panhandle near Pensacola. The other is for Leap of Faith, Inc., of Lebanon, Tennessee. Both will air religious-based programming beamed to Europe, Africa, North America and South America.

WX4NHC's Annual Radio Test

The National Hurricane Center (NHC) held its version of Field Day May 30, when NHC's amateur radio station WX4NHC went on the air to promote awareness of the hurricane season and to test station performance on frequencies and modes used during an actual hurricane emergency. If you worked WX4NHC or heard it on the bands during the test, you can receive a QSL by filling out their on-line QSL form on the WX4NHC web page (**www.wx4nhc.org**). Or write to WX4NHC c/o Julio Ripoll WD4R, 14855 SW 67 Lane, Miami, Florida 33193-2027.

WX4NHC QSL card (Courtesy: National Hurricane Center)

The Hurricane Watch Net is activated on 14.325 MHz "…whenever a hurricane is within 300 miles of a projected landfall or becomes a serious threat to a populated area." For more details visit the Hurricane Watch Net at **www.hwn.org**.

15 Year-old YL Top Texter

Kids love code, but they need a reason to want to learn it and, like it or not, it's not Morse code they're learning. Instead, it's a self-made code designed to be sent with thumbs flying on tiny cell phone keypads and appearing on screens only young eyes can easily see. It's called "texting" and the U.S. texting championship, held in late June and sponsored by electronics manufacturer LG, was won by a 15 year-old girl who beat out the two other top texters (also girls) out of 250,000 entrants, for the title and $50,000 in prize money. Maybe you're thinking, "i i i o," but, I say, "u n t c o." LG also provides an online de-texter at **www.lgdtxtr.com**.

SATELLITES

Ulysses Shut Down After 18+ Years

For more than 18 years the spacecraft known as Ulysses gave Earth-bound scientists views of the Sun never seen before. But, by June 30 of this year its jets had nearly depleted the onboard supply of hydrazine fuel needed to continue making maneuvers. NASA put the satellite in "monitor" mode on its final communications pass. According to NASA, Ulysses is "the first spacecraft to survey the environment in space over the poles of the Sun in four dimensions of space and time."
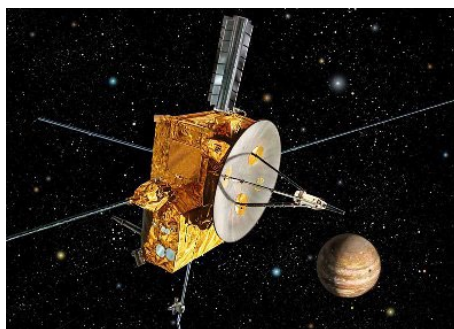
Ulysses in monitor mode from now on. Satellite spied on the sun from many angles for more than 18 years. (Courtesy: SOHO/NASA)

DHS Nixes Domestic Spying Program

Many news outlets were reporting the cancelling of a program to allow federal, state and local law enforcement agencies to use imagery generated by U. S. spy satellites. Department of Homeland Security Secretary Janet Napolitano killed the Bush-era plan when she was told that such spying was not a priority by state and local officials.

Sea Launch Bankrupt

The *Seattle-Times* reported on June 25 that Sea Launch, a joint venture in which the Seattle-based Boeing company owned a 40% share, has filed for Chapter 11 protection. The company, created in 1995 by Boeing and several Russian and European-based companies, had been using an ocean-going platform in the Pacific Ocean to launch commercial satellites into orbit. The *Seattle-Times* piece noted that Boeing itself was owed nearly a billion dollars by the now bankrupt Sea Launch company.

Satellite/Cable Bills Buck Economy

Despite the plummeting economy, increasing loan default rates and general bad economic news, the cable and satellite TV industries strapped on the party hats to celebrate a 7.5% increase in monthly cable TV bills and a nearly 9% increase in monthly bills to satellite TV customers over the period from July to December, 2008. The two are tracked by *Multichannel News*, a cable/satellite TV industry publication, in a report that showed that cable TV bills have risen 122% since 1995. The average cable-TV bill is $71/month, while the average satellite TV bill is $74/month. One reason for the upturn in billing has been that consumers are opting for more expensive packages such as high-definition channels and digital video recorders.

AM/FM/TV BROADCASTING

DTV Switch No Pay-TV Payday

An article in the *Financial Times*, following the final June 12 DTV switch, noted that cable TV and satellite TV companies had seen little additional signups in the run up to the final cutoff date. Instead, households were busy upgrading their home antennas for off-air reception. The article noted that the Consumer Electronics Association saw a 48% jump in off-air antenna sales last year. And, that Antennas Direct, one of the largest U.S. off-air antenna makers, saw a 224% increase in first quarter sales this year.

Clearstream High Gain DTV VHF antenna is one of new off-air antennas flying off the shelves at Antennas Direct in the run-up to the DTV shut-off date. (Courtesy: Antennas Direct)

FCC ACTION

NYC Jazz Station to Draw One Million New Listeners

Very few stations in the U.S. can potentially reach an additional one million listeners just by relocating its transmitter and antenna. But, if you're WBGO "Jazz88.3FM" that's just what could happen. This past June they received

permission from the FCC to move its transmitter and antenna from Newark, New Jersey to a midtown Manhattan building putting it nearly twice the height of its current location. But, it could take some time to happen. The station now needs to raise the money to make the change. The station already claims some 400,000 weekly listeners. To hear the once named "Jazz Station of the Year" listen live on-line at **www.wbgo.org**.

Midland Radio Fined $21,000

A design miscue netted Midland Radio Corp., maker of FRS/GMRS, weather radios and CB sets, a $21,000 fine imposed by the FCC. Somehow the Commission received information indicating that Midland was marketing General Mobile Radio Service (GMRS) handheld sets that have a voice scrambling feature. It's that feature that landed the company in trouble, because the FCC doesn't allow scrambling of transmissions on such radios.

Midland maintained that they did so in order to compete in the market that had other manufacturers offering the same feature. And, according to FCC documents, Midland argued that "…because no enforcement action was taken and one of those products remained certified, it was justified in assuming that the Commission had decided not to require the products to come off the market."

However, the Commission found that two of the models were in violation of its FCC certification and fined the company $7,000 per model for a total of $14,000. The Commission tacked on an additional $7,000 for having marketed the noncompliant products over a five year period. The Commission said the total $21,000 should be a deterrent to other highly profitable businesses dealing in noncompliant products. FCC documents put Midland's annual revenues at just under $10 million.

GMRS License Fee vs. Fine

Compliance with FCC rules to be licensed in order to operate GMRS radios is rarely enforced. So rare is it that, of the millions of sets sold, only a few tens of thousands of licenses have been issued at $80/each, and most of those are never renewed. Still, rules are rules, says the FCC. And, when a company using GMRS sets without a license gets caught, the Commission lowers the boom.

Acting on a tip to the Philadelphia office of the FCC from the Personal Radio Association, an *ad hoc* citizen's group organized to police GMRS license rules on behalf of legitimate GMRS license holders, the FCC set out to catch Bear Creek Mountain Resort, Macungie, Pennsylvania, in the act of flagrant GMRS radio piracy.

On February 21, 2008, working the day watch out of HQ, an FCC agent checked the Commission's database for a GMRS license issued to Bear Creek Mountain Resort and found none. Later that day, according to FCC documents, "the agent, using a mobile digital direction finding vehicle, monitored several frequencies near Bear Creek…the agent heard an individual request assistance bringing a girl with a broken wrist down the mountain." Gotcha!

Well, even if you're using GMRS radios for health and welfare and safety of the general public, if you don't have the license, you can expect a fine. So, the FCC slapped Bear Mountain for $10,000, as stipulated by law. Bear Creek argued that the company that sold them the radios never explained that a license was required. The Commission was unmoved. But, Bear Creek applied for and was granted a GMRS license later that month and the FCC was mollified enough to reduce the fine to $5,000.

MT READERS ONLY

To access the restricted website for the month of September, go to **www.monitoringtimes.com**, click on the key, and when prompted, enter "**mtreader**" under the user name. Your password for September is "**ditdahdit**" – Check in each month for new material!

Morse Code, Alfred Vail, and the Telegraph
The True History

By Gregory Smith WB2PPQ

Alfred Lewis Vail had an important role in telegraphy and wireless communications, although few radio enthusiasts have heard about him. Vail historically is known as the American telegraph pioneer: The telegraph that Vail perfected revolutionized nineteenth-century communications.

You may wonder where the word *telegraph* came from. Telegraph is derived from Greek origin, combining *tele* (far off) and *graphein* (to write).

Most of us think of Samuel Morse when we think of Morse code or the telegraph; however, history might have taken another course without Alfred Vail. Samuel Finley Breese Morse might not have been able to develop and patent the code as we know it today, if it were not for Vail.

An Idea is Born

The idea of the American telegraph can certainly be credited to Morse. This thought came to Morse while he was voyaging from Europe to America aboard the packet ship *Sully* in 1832. Morse had conversations with Dr. Charles Jackson regarding some of Joseph Henry's experiments that were done two years previously.
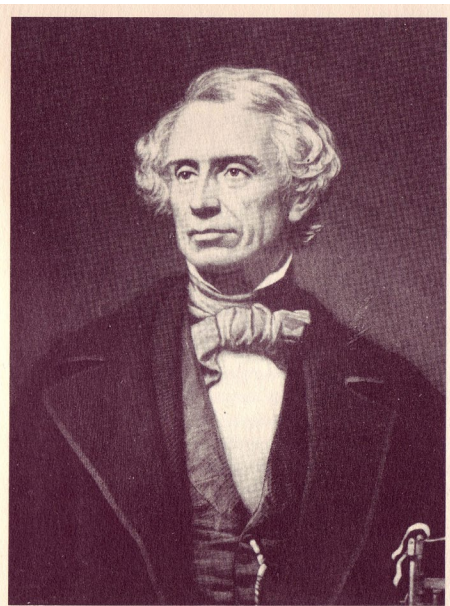
Joseph Henry, an American scientist, had proved that a d.c. current could flow a distance of one-half mile and still have enough energy to operate a relay magnet or ring a bell at the end of the wire. It is believed that these experiments gave Morse the impetus to apply the principles to messaging, which led to the invention of the telegraph.

So what was Vail's part in the development of telegraphy which became synonymous with the famous Morse code?

First, let us go back for a brief history on Alfred Vail; he was born in Morristown, NJ on September 25, 1807. Upon graduating from common school, Vail worked at his father's iron works business. At age 20 he became foreman in charge of the entire operation. During his internship with his father, he developed the skills to become a talented mechanic.

In 1832 Vail decided to leave the Vail iron works and begin his academic work at the University of the City of New York. At that time he had an interest in becoming a Presbyterian minister. He graduated from that university in 1836.

Best Friends

Vail and Morse had a friendship based
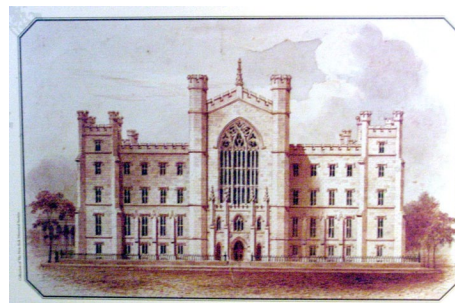
New York University

on their relationship as student and professor. They even shared the same boarding house and attended the same church. Interesting enough, both had considered the ministry, though neither pursued the ministry as a profession.

Vail Iron Works

Samuel Morse's father, Dr. Jedidiah Morse, a minister, felt his Yale educated son had ruined his future by his career choice in art. Morse and Vail had very different personalities; Morse was artistic and was considered a leader, organizer, energetic, and impetuous. Vail was known to be a mechanical genius, totally focused upon whatever he was doing, and also a very loyal person.

Morse, upon finishing his art studies in London under Benjamin West, returned to America to begin his career in art. He painted portraits for $15.00 each, including some notable people, such as Noah Webster and President James Monroe. In 1837, Morse – a widower with children to support – was financially poor and he would often have to ask the Vail family for money to pay for his stagecoach fare.

Morse also served as an unpaid professor at the University of New York. This position

Samuel Morse

Alfred Vail

Morse Painting of Morristown Iron Works

aided him by obtaining private art students that provided a small income. Morse came to the conclusion that he had to change his career from art to science to achieve greater financial success.

Demonstration at the University, City of NY

The following year Vail made a visit to his alma mater, where he accidentally walked into Samuel Morse giving a demonstration. Morse was in the process of sending a message on his "Electro-Magnetic Telegraph." The room had one-third of a mile of wire draped from the walls to make the demonstration more realistic to those present. It has been said that Vail was drawn to this machine like a magnet. This amazing demonstration would forever change messaging.

Professor Morse had spent five years in designing and constructing a rough, somewhat working prototype. Morse needed financial resources of $2000 to further develop his idea, so he had gathered a group of potential investors to witness his code messaging system. Back in the 1800s, this was a considerable sum of money, especially during the time of a severe depression in America. Morse desperately needed these backers since he had no money to develop the telegraph himself.

Unfortunately, they were not impressed

and declined to take part in the project. Morse's well-to-do brothers had declined to invest in the telegraph as well. Messages back in the early 1800s relied on both stagecoach and pony express. Perhaps these potential investors thought that pony express was a better way!

A Partnership is Formed

However, all was not lost: Alfred Vail was very impressed with the Electro-Telegraph. Morse successfully persuaded Vail to become a partner to develop the existing prototype into a refined product. Also, Vail promised to finance the applications of both American and foreign patents. In turn, Vail would receive partial rights to the developed invention.

This partnership was to Samuel Morse's benefit, since he lacked money to progress with the project and he lacked good mechanical
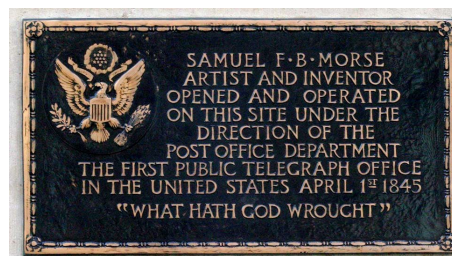
Engraving New York University Circa 1835

design skills to further develop the Electro-Telegraph.

Alfred Vail got his brother, George, and his father, Judge, to provide the financial resource for Morse's Electro-Telegraph. This would allow the project to go forward in developing the telegraphy equipment and messaging protocol for patenting.

The First Laboratory Message

The telegraph development was going very slowly and Alfred's father Judge was getting impatient. He had many discussions with his wife on how foolish he had been to ever invest in such an apparatus.

None too soon, Vail solved enough of the early problems to demonstrate a working unit to his father. The lab had one third of a mile of wire wound around the room to simulate that distance. Judge Vail selected the message to be sent: "A patient waiter is no loser." The message was successfully sent and received!

Typical Morse Number to Word Dictionary Format

Alfred's friend, Dr. Leonard D. Gale, a professor of geology and mineralogy, also joined the partnership, along with a teenage boy, Master William Baxter. Their friendship began when Alfred was a student of professor Gale. Samuel Morse demonstrated the telegraph in Dr. Gale's lecture hall at the university. Dr. Gale became an important part of the development team in working with battery designs.

Master William Baxter served as Vail's assistant in the Morristown laboratory. Since the electric light bulb had not yet been invented, available light was critical. Vail located the telegraph laboratory on the third floor of the Vail cotton factory. This was a large room with excellent window light and complemented with good tools. Another asset was the laboratory's location, away from other activities. Doors could be locked and development could progress until a patent was granted for the telegraph.

Baxter worked diligently on the telegraph and shared Vail's excitement. Historic records state that Morse made few visits to this laboratory.

Obstacles and Worries

Electrical wire was not yet on the market place, so Vail needed to find a source to connect the battery and other parts of the circuit. To obtain wire for the lab experiments, Vail bought bare copper wire that was used to fabricate ladies bonnets. This wire had to be insulated, so cotton insulation was painstakingly wrapped by hand around the length of bare wire. Just imagine the time required to wrap a mile of wire!

(As a sidebar, many old pipe organs and antique radios still contain cotton-insulated wire and are still functional today.)

Morse was fearful that the British would

patent the telegraph first. He had to really push Vail on getting a working prototype right away. Morse pictured in his mind the great uses of this device. He could visualize companies using the telegraph between seaports. Also, he thought the military would have great need for the telegraph, since it sent instant messaging along with the written record that the military required.

Morse stated enthusiastically that even homes would be outfitted with the telegraph in the future, although Vail and Morse had different opinions on how the messages were to be received – using sound or paper. Morse insisted on the use of paper to keep a record of the given message.

The Morse-Vail Agreement

Morse and Vail entered into an agreement on September 23rd, 1837 for Vail to construct a working model of the telegraph at his own expense to exhibit before officials in Washington, D.C. Also, as mentioned previously, Vail had to pay all the costs associated with obtaining patents. One forth of the American rights would go to Alfred, while one-half of the rights would go to Alfred's brother George. If patents were granted in European countries of France, Scotland, England or Ireland, the rights would be split in half.

Speedwell Laboratory Development

Morse's original code used a mark to denote a number, and that given number corresponded to a word. This was not a very efficient system to use in messaging, because it required time to look up and convert the number to a reference book word. This dictionary contained 5000 commonly used words.

Morse wrote to Vail stating, "It would be no less tedious to use: for example if, 'England' was represented by 252; 'Wednesday,' by 4030. You will be pleased with my plan of the permanent dictionary……"

The prototype utilized a long rectangular tray that had a narrow slot cut into the entire length of the tray. This would permit individual number contacts to plug into a slot in the arm to form a message for transmitting. The sending arm was horizontally moved along the contacts by rotating a wooden crank wheel.

The second arm worked as a stylus; when the lever position was in the on position, a rod would drop into a mercury vessel, causing current to flow from the battery to the electro-magnet receiver. This action, in turn, would position the lead pencil to make a mark on a strip of moving paper. The paper was advanced by a gravity-fed weight on a cord.
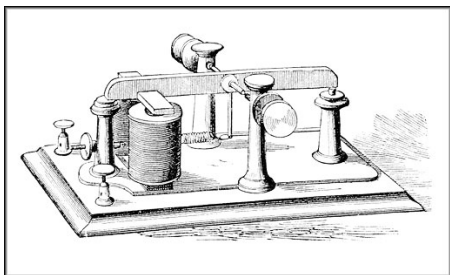
Cast Metal Number Contacts

The first battery was constructed of cherry wood, having eight cavities lined with beeswax. The beeswax was to contain the acid and prevent degradation of the cherry wood. The battery used zinc and copper as elements.

This prototype had many problems, one being that the receiver electro-magnet would become magnetized and stop working. The other big problem was that the second contact arm would bounce. Also, the pencil lead would wear down and the message would not be recorded.

The lead pencil was eliminated and replaced with a pen; however, the pen had problems as well, since it would run out of ink periodically. Vail incorporated an improved design for reliability using three individual pens to record the message.

To solve the relay magnetism memory problem, Professor Gale built two Cruikshank batteries that would provide more power. These batteries contained 60 plates; each plate measuring 6 square inches. Alfred was delighted when he received the shipment from Dr. Gale. The more powerful batteries, along with the newly designed electro-magnet with greater number of turns, greatly improved the relay operation.

Wire for making electro-magnet helices used top quality annealed copper covered with cotton thread that concealed all the metallic surfaces. Next, the wire was saturated with shellac, then coated with a composition of asphaltum, beeswax, resin and linseed oil.

Alfred Vail Invents the Code

Printing messages was a real problem, so Vail made improvements to the code and developed a superior telegraph machine. Alfred assigned young Baxter a project to research the most common used letters used in newspaper text.

The most common letter he found was "e." So this was assigned the simplest code symbol "dot [.]." (Author's note, as an avid CW operator, I will always appreciate the work of Alfred Vail!) Vail also made significant design improvements in the relay used to receive the code, including changing from wood to metal construction.

To Vail's disappointment; Morse quickly patented these technical improvements, giving no credit to him.

On October 6th, Morse went to the United States Patent Office to file a caveat that stated, "The machinery for a full practical display of his of his invention is not yet completed and he is therefore prays protection of his right till he shall have matured his machinery." Upon conclusion the document read, "What I claim as my invention ... is a method of recording permanently electrical signs, which by means of metallic wires or other conductors of electricity convey intelligence between two or more places."

Morse's patent was called the "American Electro-Magnetic Telegraph." As unfair as this may seem, Vail had foolishly signed a legal agreement that stated that all patents developed together would be patented in Morse's name. Morse had Judge Vail's blessings on this detail. Morse told his partner Vail that the United States Patent Office required a single name on a patent application and that it would be more efficient in achieving a patent if done in this manner.

George Vail and other family members were terribly upset when they heard this news; they commented: "The only place the Vail name will be seen are on the expense invoices."

Stephen Vail Building – Morristown, NJ, First Public Demonstration

The Morristown Public Demonstration

The first public demonstration of the telegraph was made on January 6th, 1838. Alfred Vail transferred the Electro-Telegraph from the ironworks laboratory to Stephen Vail's building across the street. (Note: This building still stands today where replicas of the Morse/Vail telegraph equipment can be seen on display. The Morris County Park system in Morristown, N.J. has made this facility available to the public and is child friendly with numerous working displays.)

Historical records report that several hundred townspeople were anxiously waiting to witness the new telegraph invention. Judge Stephen Vail selected the message to be sent. His message was kept secret and the contacts were loaded on the transmitting tray. As the wooden crank turned rapidly, the excited crowd of witnesses heard clicking. Then receiving tape was removed and decoded from the now thick wordbook. Finally as everyone listened, the message was read, "Railroad cars just arrived, 345 passengers."

It is said that this message coupled the use of telegraph to transportation. The local newspaper, *The Journeyman,* stated, "Time and distance are annihilated, and the most distant points of the country are by its means brought into the nearest neighborhood."
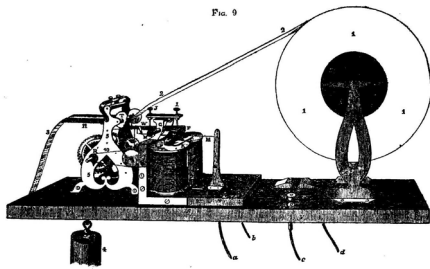

The Recording Electro-Magnetic Telegraph Receiving Relay

Telegraph Testing Expands

Following this success, more demonstrations followed in New York City and the Franklin Institute in Philadelphia. Morse was so enthused with the Electro-Telegraph that he showed his wonderful invention to U.S. President Van Buren and his cabinet. Congress declined to commit to purchase the telegraph, but this event would happen five years in the future.

During the time of the work on the telegraph, train tracks were being installed in Morristown. Men working on the railroad and local farmers had a good laugh when they heard of the work being done on the telegraph. Ben Franklin's discovery of electricity was thought of as a joke with no practical use. Master William Baxter was publicly referred to as "the lightning boy." The town's people rumored amongst themselves that a lightning generator was being developed in the Vail Laboratory.

Alfred Vail designed the key as shown below that was used in 1844 to demonstrate the telegraph between Washington, D.C. and Maryland. Note the strip of metal that was used as a spring. Can you image the friction and force created where it contacts the lever?

The original Vail key is on permanent display at the Smithsonian Institute in Washington, D.C. An authentic duplicate of the historic piece can be bought from R A Kent Engineering in the UK.

The United States Congress was so impressed by this invention that in March 1844 they authorized a telegraph line between Washington, D. C. and Baltimore, MD. A congressional bill signed by President Tyler on March 3rd, 1843 granted $30,000 to fund the experimental telegraph line.

The Original Vail Key on display – Smithsonian Institute

Morse had an initial plan to lay the telegraph wires underground. He had consulted with Ezra Cornell, the inventor of the trench digger, to use his newly designed machine to place the wires underground. This attempt was unsuccessful, so Morse decided to mount wires on telegraph poles.

The telegraph line was completed on May 24th, 1844. Morse had asked Annie Ellsworth, daughter of the Commissioner of Patents, to select a message to be sent. Her selection was a biblical phrase, "What hath God wrought!" In Baltimore, that message was successfully received and telegraph history was made on that day! The message was sent and received using the code system designed by Alfred Vail.

Morse and Vail continued to make improvements on the Electro-Telegraph for another 4 years. But finally, Vail, gaining no credit for his improvements, lost his passion and interest in the telegraph.

In 1845 the Baltimore to Washington telegraph service was officially given to the United States Post Office. Congress would not fund any more expansions of other telegraph stations. The Magnetic Telegraph Co. expanded the service to Philadelphia and New York. Soon, over 40,000 miles of telegraph wire criss-crossed the United States.

Internationally, telegraph service was in service in Australia, India, Russia and other European Countries.

Commercial Telegraph Installations

The telegraph required four parts: telegraph poles, wire lines, batteries and sending/receiving instruments. The following information provides some detail on each.

Wires

The telegraph wire material circa 1845-1847 was either #14 or #16 gauge un-annealed copper wire. These lines broke often because the copper wire was soft and the distance between poles caused the wire to stretch then finally break. Extreme weather conditions in both summer and winter added to that wire breakage problem. Eventually, at a later date, these lines were changed from copper to iron for more reliability.

Iron wire had to be larger in diameter because of the increased resistance as compared to copper wire. The resistance of iron wire is about 7 times greater than the same diameter of copper wire. A single bare wire was used along with earth ground return to create a closed circuit. With good insulators, this wiring provided low capacitance and inductance while giving good bandwidth. Using ground as the second conductor halved the cost of each circuit.

Telegraph poles were 25 to 30 feet tall and made from cedar, white oak or chestnut, with the bottom portion tarred. Records report poles were bought at a cost of 80 cents to one dollar and fifty cents. In America, poles were bought from local farmers; some contractors just cut what trees were available in the area. These unseasoned poles still had bark on the surface that caused considerable electrical leakage. In contrast, quality poles were made from seasoned hardwood, then charred, and finally tarred to provide good life.

In America poles were erected along city streets, but these became unsightly since they had so many wires attached to them. New York and other cities back in the 1880s wanted all the electrical wires buried underground. For rural wiring, forty poles per mile was found to be ideal, which gave strong support for the telegraph lines. However, some contractors skimped on the number of poles installed to 20 poles per mile. A span of 176 feet of iron wire gave about two feet of wire sag and tension of 117 pounds. For single, the line was secured on top of the pole; where multiple wires were required, a bolted cross arm was added to the pole. It is interesting to note that the poles lacked lightning protection; no lightning arrestors were incorporated for safety.

Batteries were used in early telegraph systems since power was minimal. In the 1870s, dynamos were used in some instances, but batteries were chosen most often because they were inexpensive. When power stations became available in 1900s, the telegraph began to switch to this source of power. Large power stations used steam engines to power generators.

In America, the "Grove cell" was used on the first Morse telegraph in 1844. William Robert Grove in England invented this cell. (Author's note: If Bob Grove could trace his ancestry to this inventor, it would explain a lot.) This battery was comprised of a glass container 3" high and 2-3/4" in diameter with dilute sulphuric acid. Placed inside was a cast zinc cylinder
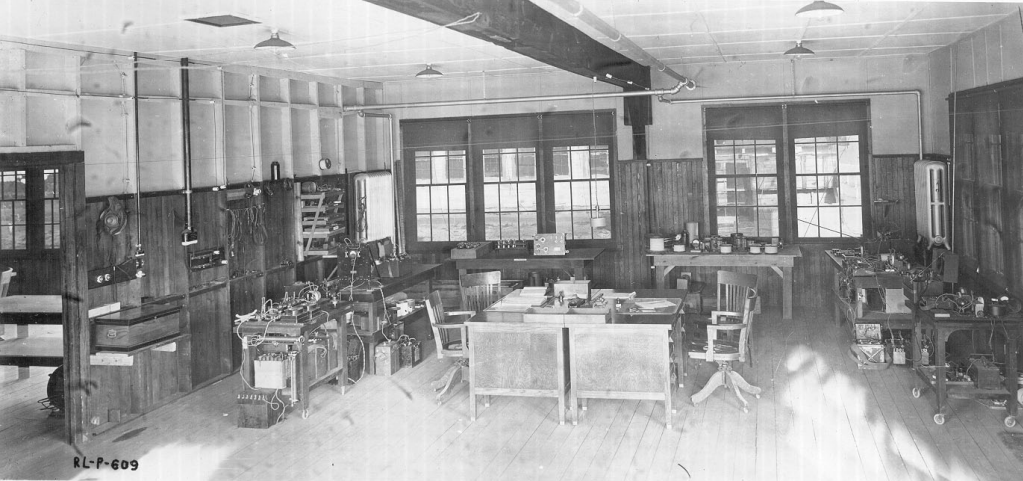
A Large Telegraph Office

(negative) along with a pottery cup. This cup had a platinum foil strip (positive) filled with nitric acid.

The Grove cell had about twice the voltage of zinc-copper batteries. One Grove cell was needed for every 20 miles of telegraph line. For a distance of 800 miles, 50 Grove cells were needed! The Grove battery had an output of 2.14 volts and an internal resistance of 0.5 ohms.
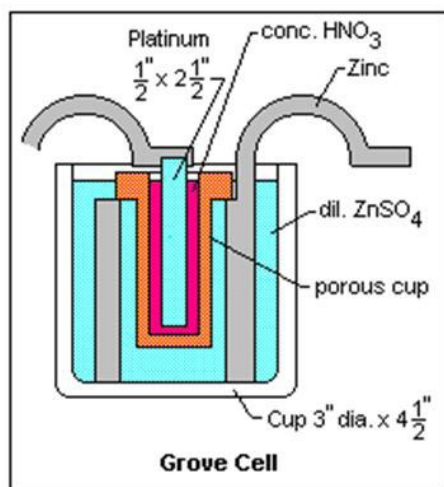
Vail's initial magnets were massive, weighing up to 75 pounds having about 3000 turns of number 16 gauge copper wire insulated with cotton and shellac. The Morse relay was a neutral relay. That is, its armature moved when current passed through its coils, and was restored by a spring when the current ceased. A neutral relay responds equally well to currents in either direction.

Early 1840s Sounder

The Morse register sounded with a loud clatter while messaging; the relay would also click in unison. Operators including Vail could listen and decipher the message twice as fast as compared to the reading the tape. Morse strongly objected to this practice and insisted on decoding from the tape, since this was one of the most important features of the Morse telegraph.

Experienced operators said that receiving by ear was as natural as listening to speech. Often the tape was only used when verification was required. At a later date, the register was replaced with a sounder, sometimes referred to as a pony sounder.

This design is similar to a modern relay with an electromagnet and a hinged armature with two stops. Often to amplify the sound, the sounder was placed into an acoustical container or box. Even empty tobacco cans were used for this purpose! Operators commented on how easy the Vail code was to decode by ear.

Western Union trained women to replace highly paid telegraphers. Women were excellent in that pursuit, but in time they were replaced by automatic equipment. On line Morse telegraphs always used Vail code. Some remote railway stations did not have an operator and had to use the Morse register.

Dwindling Vail Fortunes

In Alfred's journal dated March 1848: "Prof. Morse is making a new specification of his invention. I think I shall take out a patent for my pen key, disconnecting key; my compound receiving magnet with circular armature and circular back piece combinations for connecting and disconnecting the grooved roller upon pilots; my new accommodating paper reel; improvement in the form zinc, lightning protector; horizontal register magnet."

However, he did not follow up his journaled intentions to patent his inventions because of the original agreement he signed in 1837, and also (as he later wrote) "to preserve the peaceful unity of the invention."

The Vail family continued to feel helpless with no clear rights or fame. William Baxter was also disenchanted in Samuel Morse as written in various papers. As new telegraph lines were placed in operation, Morse and other shareholders became wealthy. Alfred Vail had to sell off his shares to support his wife and total of 9 children.

Vail left the telegraph industry in 1848 because he believed that the managers of Morse's lines did not fully value his contributions. His last assignment, superintendent of the Washington and New Orleans Telegraph Company, paid him only $900 a year, leading Vail to write to Morse, "I have made up my mind to leave the Telegraph to take care of itself, since it cannot take care of me. I shall, in a few months, leave Washington for New Jersey,...and bid adieu to the subject of the Telegraph for some more profitable business."

In July of 1849 Alfred Vail retired and left Washington, D. C. for his native home at Speedwell back in Morristown, N.J. During this time, the Cholera epidemic was rapidly spread-

ing through the southern states. He feared that he would be susceptible to this disease because of his weakened condition from being exhausted working on the telegraph. In 1851 there were more than 50 telegraph companies operating within the United States. The telegraph had reached perfection by the time of his death in 1859.

A Gravesite Visit

Having spent several months of research on both Samuel Morse and Alfred Vail, I not only viewed the Vail museum, but I wanted to pay my respects to Alfred Vail. I traveled to Saint Peters Church in Morristown, NJ. Near the church are several towering monuments and the one in front of me is Alfred Vail's resting place. In my mind I reflect on one of Alfred's writings:

"I do not seek renown for myself, I care little for the world's applause….But what I do desire is truth, in relation to the history of the improvements of the Magnetic Telegraph…as may be equivalent to the risk I have run, the interest I have shown, and the improvement I have made in the enterprise."

Approaching the monument for a closer look, I find the added inscription "INVENTOR OF THE TELEGRAPHIC DOT AND DASH ALPHABET." I rub my hand across these words and silently thank the person whom I believe to be the true inventor of Morse code.

As a radio amateur, CW (continuous wave) mode has given me great joy over decades of radio activity. It is reported that in 1911 during the dark of night, someone, perhaps a grandson, had this inscription added to the monument. No doubt this was done to let the world know that Alfred Vail was the true inventor of the dot and dash alphabet.

Alfred Vail's Monument

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Courtesy "Speedwell In The Nineteenth Century"
Gravestone, Stephen Vail building, Author

Meet the QSL Mistress
at Coast Station KSM

By Christopher Friesen, VE4CWF

On July 12, 1999, the commercial use of Morse code ended in the United States of America. On that date, in Globe Wireless' Half Moon Bay master station south of San Francisco, former operators, company representatives, and members of the press gathered to witness the final transmission – final sign off – before ceasing the operation of coastal stations KFS and KPH. These two stations were the last in a long line of maritime radio stations that had existed to pass traffic via Morse code (CW) and Radio Teletype (RTTY) from ship to shore and shore to ship.

Denice Stoops and Richard Dillman were both at that final transmission. Dillman saw the event as a celebration of the heritage and tradition of commercial Morse code. To his delight, he was afforded the opportunity to send a commemorative message on behalf of the Maritime Radio Historical Society, to which he and Stoops both belonged. Stoops, as the first female operator ever hired by KPH, was something of a trailblazer in the male-dominated world of commercial Morse operators. She saw the event as a funeral. For her, the end of commercial Morse was more than the loss of a noble industry; it was the death of her career.

"I had gone to mourn and I wore black," she says of that final day.

But, for these two and a few other dedicated volunteers, the end of the era of commercial Morse code did not mean the death of commercial Morse code itself. Shortly after that final broadcast, the Maritime Radio Historical Society was granted a license to operate a new coast radio station with the call sign KSM. Operating out of the former KPH facility, KSM can be heard for a few hours on most Saturdays, preserving the traditions, skills, customs, procedures and honor of commercial Morse code operators.

Dillman is now Chief Operator at coast station KSM, a position he holds with pride. He says that in the heyday of commercial Morse, there were a dozen or more coastal stations operating. Some were run by companies like Globe Wireless, RCA Radiomarine, Tropical Radio, United Wireless, American Marconi Company, and United Fruit Company, while others were private, single station operations.

To become an operator, Dillman says, required a commercial radiotelegraph license. Stations passed traffic that included anything from information on maritime commerce to personal greetings on behalf of individuals and companies.

They sent weather bulletins and alerts and news reports that could be used in a ship's on-board newspaper.

Today, proprietary forms of data encryption have replaced Morse code, and maritime communication companies use a mixture of High Frequency (HF) broadcasts and satellite networks to deliver information to vessels at sea. These communications appear as normal e-mail to the sender and recipient, but are automatically routed through whichever broadcast medium is cheapest for a vessel's given location.

Large commercial Morse code networks still exist in other countries.

Operating position 1 at Point Reyes, Dick Dillman at the key. All the original equipment is still in place as it was left on the day the station was closed in 1997. On this occasion the station is being operated in the amateur service under the call K6KPH for Straight Key Night 2000/2001. (Photo courtesy Richard Dillman/MRHS)

THE RADIO ROOM AT RCA COMMUNICATIONS STATION KPH   Point Reyes, California ● December 1979

Here's the "Den of Thieves" as it looked in 1979. Denice Stoops "DA", the first female operator at KPH, is in the center. Seated in the foreground to her right is Ray Smith "RC", senior Morse operator and the person who sent the last message from KPH on the day it closed. (Photo courtesy Richard Dillman/MRHS). Insert: Denice Stoops at the controls. (Photo courtesy of Denice Stoops)

Post war KPH, crammed into a single room at the point-to-point receive site at Point Reyes. A two position receiving station was set up in the former station lunch room. The resident point-to-point men thought it was bad enough to have KPH and its rowdy crew invade their formerly quiet domain. Stealing the lunch room probably didn't make them any more popular! (Photo courtesy Richard Dillman/MRHS)

Japan and Korea still have commercial networks that communicate with fishing fleets, and Dillman says he has also heard Chinese and Turkish stations on the air.

"They are all ace operators," he says of his modern international counterparts. "But their numbers are very small compared to the golden years of maritime Morse when signals were heard from one end of the band to the other."

And, of all those signals during the golden years, one station in particular earned a reputation amongst fellow operators for consistent quality: KPH. It was the reputation that attracted Denice

The exterior of coast station KPH as it appears today. (Photo courtesy of Richard Dillman/MRHS)

Stoops, who would become its first female operator.

Meet the QSL Mistress

Denice Stoops began her radio career in the United States Coast Guard (USCG). After completing her basic training in New Jersey, she traveled to Petaluma, California, and started radio school shortly after her nineteenth birthday. She was stationed at NMC, then the USCG's West Coast master communication center in Pt. Reyes, California. NMC was only a short distance away from

KPH and she often visited. When asked what she would do after her tour in the USCG was finished, she often joked she would go and work at KPH.

"I had been released from the service for about three months and was looking for work when I received a phone call from the manager of KPH offering me a job," she says.

Although she wasn't yet licensed to operate commercially, the station manager offered to hold the job for her until she had a chance to take the commercial Morse exam. Her training in the USCG had prepared her well for work as a radio officer, where copying Morse was performed using touch typing on a mill – a telegraphic typewriter. But for her commercial exam, she was allowed to copy using only pen and paper. She failed at her first licensing attempt, but two weeks and much practice later, retook the exam. This time she passed and stepped into an unsung, but important place in American radio history. She became the first female coast station telegrapher hired by modern-era RCA.

"As far as I know, and I've been claiming for 30 years, I am the first female commercially licensed civilian telegrapher at an American privately owned coast station after the Second World War," she says.

Stoops says it wasn't difficult for her to enter a male-dominated profession since she's always been able to "fit in with the boys." Her up-bringing (she's the eldest of three daughters) where she spent time hunting, fishing, and taking care of the yard with her father, and her time in the military, gave her experiences that her male counterparts could relate to. There were holdouts, though. Some older operators took offence at her colorful vocabulary. However with time, familiarity, and a growing appreciation for her skill, these attitudes eventually changed.

"It took years for some of them to come to respect me," she says. "But eventually they all came to treat me as a respected individual."

From Commercial to Amateur

Today Stoops is the service manager for a high-end window and door retailer. She is a member of the Maritime Radio Historical Society and she is a radio amateur with call sign KI6BBR. After being trained in the USCG, passing the commercial Morse exam and spending most of her career as a commercial Morse operator, she only became a licensed radio amateur three years ago.

"I got the ham ticket to enable me to activate the museum exhibits that I was working at with other members of the MRHS," she says. "In case one of them were absent."

Interestingly, her involvement in amateur radio has led to another curious first.

Stoops explains.

"The ham club where I took my exam gave me a complimentary membership for the remainder of that year. After that, they invited me to run for a seat on their board of directors. At the first board meeting I attended, they made me president for a two-year term. They mentioned something about the club never having had a female president (they just celebrated their 65th birthday last year) and that sort of cinched it for me."

One of the museum exhibits Stoops works at, the *SS Jeremiah O'Brian*, is a Second World

War-era Liberty Ship. Stoops has been a crew member of the *O'Brian*, which is docked at Pier 45 (Fisherman's Wharf) in San Francisco, for about two years. On the *O'Brian*, she is able to make use of her commercial Morse experience.

"I prefer to activate the ship's original radio equipment and call KSM," she says.

Despite being an active member of the Maritime Radio Historical Society and a former KPH operator, Stoops doesn't spend much time operating KSM during their weekly Saturday schedule.

"For some special events, such as Marconi Day and, of course, Night of Nights, I do operate from the station," she says. "Richard usually makes an announcement if I am going to be at the key."

Stoops is responsible for issuing KSM QSLs, which she playfully signs as "QSL Mistress," a moniker she says was coined by Richard Dillman.

"I embraced it, and it stuck," she says. "I have been receiving signal reports from listeners all over the world who now address mail to us that way. I think it's pretty chic, like a title of nobility."

Denice Stoops certainly deserves a title of nobility for the accomplishments of her past, both in the Coast Guard and as a commercial Morse operator, as well as for her continued support and encouragement to women in amateur radio. She has recently started writing a column for "Chick Factor," a newsletter for female amateur radio operators, where she is retelling her personal journey of a lifetime spent in radio. She is also Chick Factor International's west coast CW mentor, and has participated in their annual event from the Indianapolis Motor Speedway along with some young California ladies who are "quite accomplished Morse operators."

"I hope to inspire them to continue their involvement with ham radio and, if I'm lucky, attract other young ladies to the hobby," she says.

The Maritime Radio Historical Society

The MRHS's goal is to document, preserve, and restore artifacts of maritime radio history. MRHS volunteers have restored a Second World War-era radio console from a Victory Ship, which now resides in a permanent exhibit at the San Francisco Maritime Museum. Their website contains several "Incredible Radio Tales," first-hand accounts of "experiences and adventures" from the golden era of commercial maritime radio communications. The website also has links to the Society's Youtube channel which features videos of KSM station operation and vintage marine radio equipment in operation.

How to Hear Coast Station KSM

KSM operates on Saturdays from 1900 coordinated universal time (UTC) to 2300 UTC. They broadcast in CW on the following frequencies, 426, 500, 4350.5, 6474.0, 8438.3, 12993.0, 16914.0, 22445.8 kilohertz (kHz) and in RTTY on 8433.0 and 12631.0 kHz.

KSM's services are offered for free, but Richard Dillman says they pass virtually no traffic during their weekend schedule.

"Our single real customer is a ship of the Matson line," he says. "The R/O on board sends

Coast station KSM issues unique QSLs on replica radio telegram blanks.

his AMVER[1] messages to us when he's at sea on a Saturday. We forward these to the USCG."

Dillman says he isn't discouraged by the lack of traffic or the lack of customers. He says they remain willing to serve any maritime communications need, but the mission of KSM is much more important.

"We would continue our operations even if the number of calling ships was zero," he says. "That's because our objective is to keep the culture, traditions, and skills of the operators who came before us alive, and make sure the memory of their contributions – sometimes even including their lives – are not forgotten."

Still, there is plenty of activity during KSM's brief Saturday operation, as the on-duty operator repeatedly identifies the station and broadcasts an invitation to ships at sea to call back. Listeners will need to be able to copy CW, especially KSM's three call-sign letters, to confirm their reception. Reception reports can be sent to the QSL Mistress[2],
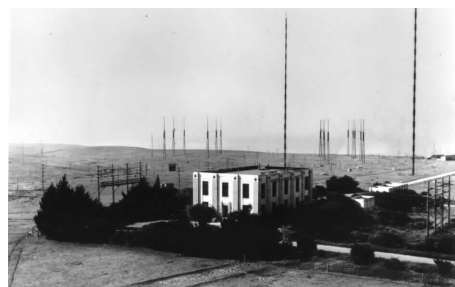
This view of Building 2, looking towards the Pacific Ocean, shows the building in its original form before the addition of Building 2A. Two of the famous Marconi 300ft. cylindrical pressed steel masts may be seen along with the H frames carrying the antenna feed lines. (Photo courtesy Richard Dillman/MRHS)

which Stoops says should include the date, time, frequency, and a snippet of information from the monitored broadcast. Confirmed reports will receive a unique response.

"KSM sends out certificates that are color reproductions of original ship-to-shore radio telegram message blanks," she says. "Each message blank is personalized to the listener and endorsed by my own hand."

Stoops says she takes a relaxed approach to verifying receptions, but will still check for the correct address, to see if her name is spelled correctly, and to see if the report contains a donation or a self addressed stamped envelope, both of which are appreciated. And there is one other important piece of information she looks for.

"Did they call me QSL Mistress? That will get them a reply even if they put the wrong date, time, and frequency," she says.

For more information on the Maritime Radio Historical Society and KSM, visit their website at **www.radiomarine.org**. To read Denice Stoops' personal accounts in Chick Factor Newsletter, visit their website at **www.freewebs.com/chickfactor.**

Notes:

1. *According to Richard Dillman: "AMVER stands for Automated Mutual-Assistance Vessel Rescue system. Commercial vessels regularly send their positions, course, speed, and next port of call to the Coast Guard in a highly formatted message. The Coast Guard enters the information into a database so when they receive a call for assistance they know which ships are closest and how to contact them."*
2. *QSL Mistress, Maritime Radio Historical Society, PO Box 381, Bolinas, California, 94926.*
3. *Internet contact: KSM@radiomarine.org or www.radiomarine.org*

RADIO FRANCE INTERNATIONAL:
L'anglais pour l'Amérique du Nord, sur les ondes courtes, s'il vous plait

By Eric Bryan

Are you, too, among the shortwave listeners frustrated by Radio France International's refusal to provide us in North America with a dedicated English service? For English RFI programs, we've always had to try and catch the overflow from their various African broadcasts. At least in my area, reception of these transmissions has always altered with the seasons, with RFI broadcasts rarely having year-round reliability. (The former relay transmissions from Meyerton, South Africa, were usually the best received here.)

The idea of an RFI English service to North America was made even more tantalizing by RFI's use of a relay site in French Guiana, along the North Atlantic coast of South America, for Spanish and French programs. I remember the reception here in the early evenings of that broadcast on 9800 kHz – the signal strength and modulation quality were fantastic, rivalling that of Radio Netherlands and the BBC's Caribbean relay stations. The music RFI sometimes played on these broadcasts was especially crystal clear and enjoyable. During an RFI strike, there was even more music to fill programming gaps.

Why, so many of us wondered, especially with the French Guiana relay, would RFI not add English to its Spanish and French broadcasts for the Americas? Via French Guiana, an English transmission would be amongst the most widely and clearly received and reliable signals in North America. Plus, in the days when Great Britain and Germany had English on shortwave to North America with the BBC and Deutsche Welle, it was always strange to me that that other European giant, France, with RFI, was missing. Especially when you consider the extensive shortwave services they had for Africa and other areas of the world – many of them in English.

The Beginnings of RFI

Radio France was established in 1929, when the French National Office of Radio Broadcasting was formed. In 1931, under the banner of *Poste Coloniale*, Radio France started

transmissions in 20 languages to French colonies. *Poste Coloniale* became *Paris Mondial* in 1938, scrapped during the occupation in 1940-1944, then resurrected.

The government-formed French Radio and Television Broadcasting (the ORTF) was established in 1964, with Radio France becoming independent of the ORTF in 1974. Then, in 1975, Radio France International was formed as a subdivision of Radio France. In 1987, RFI became separate from Radio France, broadcasting on shortwave 24/7.

English on Radio France began in the 1930s during the *Poste Coloniale* incarnation. Radio France International's English programming amounts to 33.5 hours a week. Since RFI's English broadcasts are primarily for Africa, there is an emphasis in African news. The English program to Asia concentrates on Asian topics. There are two special programs about France, *Focus on France* and *Culture in France*. Other features cover such topics as world music and the African diaspora. The weekly *Sports Insight* has eclectic and exhaustive sports coverage.

RFI Online

You'll be happy to hear that, though there is no English service for North America, there is a wealth of material in English on RFI's website, **www.rfi.fr** For the homepage in English, click the "english" link under "languages," or go directly via **www.rfi.fr/actuen/pages/001/accueil.asp** Here you'll find top news stories of the world, and special links, "In France," "Culture," and "Feature of the day."

Further down is a recent archive of news stories from the past few days, and a "Special dossiers" section with links devoted to, for example, Gaza, Uganda, and the World Financial Crisis. Also here are "rfi on facebook" and "rfi on twitter" links. Many of these text links throughout the page are accompanied by audio links.

The vertical menu of links to your left brings you news by region and topic, plus links to their music, tourist, program schedule, and French language lessons pages.

Live Online Streaming

For live streaming, click the "Listen to RFI" link in the upper left, and a drop-down menu offers you several streams. I found English by clicking *rfi languages 1*, which brings up a choice of players. English was at 0400-0430 UTC, correlating with RFI's English to Africa shortwave schedule.

For the 0430-0500 timeslot, RFI switched to its *rfi Musique* stream, with pop and world music. At 0500-0530, English was back, again per the shortwave schedule. This wasn't just a rerun of the 0400 broadcast; the 0500 program had some of the same features such as the news and *Press Review*, but the contents are apparently updated from hour to hour.

RFI On-Demand

For the on-demand links, go to the menu below the Eiffel Tower and satellite dish photo, and you'll see stream links here for the recent English broadcasts. You can choose from the 0400, 0500, 0600, 0700, 1200, 1400, 1600, or 1700 UTC programs. The "Live" link above these brings you the *rfi Musique* stream, the same one as in the "Listen to RFI" drop-down menu. (Note: the player from the "Live" link doesn't include the song and artist ID – vital if you want to track down either.)

On-Demand Sample Program

Some of RFI's English programs are 30 minutes; others, one hour. For the whole en-chilada (maybe a bad metaphor for a French station), I sampled the one-hour "1600 TU" on-demand stream. This plays the last 1600 English broadcast to Africa – at the time of writing, on 11615 and 15605 kHz.

The broadcast began with news headlines on Zimbabwe, Egypt, Congo, Nigeria, and the French Caribbean island of Guadalupe. News in detail included coverage of Sudan, Qatar, South Africa, Equatorial Guinea, Burundi, Kenya, Martinique, Afghanistan, Poland, Pakistan, Indonesia, South Korea, and China.

Focus on France followed the news. This covered President Nicolas Sarkozy's struggle with the global financial crisis, the French economy, and striking trade unions in the French West Indies. Next up was sports coverage. This was limited to football/soccer news. At the 1630 mark, the broadcast returned to news headlines.

After this was *Voices,* which was an interview with Ethiopia's Prime Minister Meles Zenawi, which focused on Ethiopia's relations with Somalia and Eritrea, and human rights abuse accusations against Zenawi and Ethiopia. The broadcast wound up with announcements for upcoming music/interview programs, a piece of Malian pop music, and another hard to classify acoustic-guitar-based song sung in French.

A frustrating note on the on-demand streams: I tried them with both the Real Player and Windows Media Player, and neither would allow me to fast-forward, reverse, or pause. Even worse, after pressing the stop button, pressing the play button again always restarted the program from the beginning. So there was little advantage to the on-demand streams versus real radio.

RFI Facebook On-Demand Option

For a much better, more straightforward method of hearing RFI English on-demand, click the "rfi on facebook" link on the homepage, or go directly there: **www.facebook.com/pages/Radio-France-Internationale-English-Service/28764872018**

Here you'll find RFI's features program links, news headlines, synopses and links, and audio links for the 0700, 1200, 1400, 1600 and 1700 programs. Punch one of these and a miniature virtual MP3 player appears. Here you have play, pause, and total fast-forward and reverse control – hallelujah! It's slick and works like a charm, and you don't have to join Facebook to make it work.

The only downside is the MP3 player is embedded in that particular page of Facebook, so if you leave the page, it shuts off and you lose your audio stream. You'll have to keep that window open and browse in a separate one to continue listening to the program.

Musique

Aside from RFI's global news and features coverage, the broadcaster is known for its music-rich programs. If this has interested you, there's a musical feast waiting for you on the RFI website.

To hear the *rfi Musique* stream, click it from the dropdown "Listen to RFI" menu on the homepage. Here you'll find music from throughout the French-speaking world (Francophone) and world music in general. This ranges from French pop to reggae to African jazz to French "sidewalk café" music with *musette* to songs in the French *chanson* style. There are also soft, melodic tunes based around acoustic guitar, piano, bass and drums, in the vein of the *A Man and a Woman* soundtrack, with lyrics sometimes more whispered than sung.

A surprising number of songs are sung in English or are bilingual. One in English was called "Clint Eastwood." I also heard a flamenco-guitar-influenced pop song sung in Spanish.

You will also want to check the other streams in the dropdown menu for music: *rfi Monde, rfi Afrique,* "rfi languages 1," and "rfi languages 2." Sometimes these simply carry the *rfi Musique* stream, but at other times they have their own music programming.

The Real Player gives you the title and artist name of the song being played. I've been able to track down some excellent music this way. A favorite is *Je suis votre homme,* by Thierry Stremler. This is a dramatic, melodic song based around piano, bass, drums, and a vocal awash with French melancholy. Those who appreciate the solid, bittersweet chord structures and romantic melodies of similar piano-based songs from The Beatles, The Move, early ELO, and more recently, Keane and Coldplay, should like it.

With the title and artist ID in the Real Player, I was able to go straight to YouTube, enter the song title in the search bar, and hear the song again and watch the video. Another good one, which had some of the old ELO dramatics,

was *La fille de l'est,*, by Arthur H. Surfing to YouTube let me hear it again, and see the video.

Radio France International also plays the music of Pink Martini, an interesting American group which writes and records songs in the French sidewalk café style and sometimes sings in French. For an excellent example of this, try *Sympathique* (or *Je ne veux pas travailler*) on YouTube. After a characteristic piano-vocal intro, it starts with a classic, sweet acoustic guitar rhythm, the traditional *chanson* vocal style. Be sure to listen for the muted trumpet: You can just about feel yourself sitting outside that café at a little round table in the French sunshine or on a warm Provençal evening with a bottle of wine and a baguette in front of you. All in all, *il est magnifique.*

Bouncing between the Real Player, You-Tube, and Amazon to track down a CD, RFI is a great place to discover new music. There's such a variety, most should find some things they like.

The *Musique* Page

In the vertical menu on the left of the homepage, clicking "RFI Music" takes you to RFI's dedicated *musique* page, **www.rfimusique.com/musiqueen/statiques/accueil.asp** Here you'll find varying featured sections – for instance, on French jazz, French rock, and French electro. Click a feature link and you'll go to a page with a profile article, a sample song clip, and sometimes "Biography" and "Discography" links.

Click the latter and you'll bring up that artist's list of recordings, with more song clips to sample through the charming *RFI Musique* player – it sports a fresh-picked-orange icon, and is accented with a juicy looking orange slice.

Back on the *musique* page, there are recently archived music stories going back about a month and a half. Some of these are features about a particular musician, others about trends, featuring several groups or artists. And again,

each of these stories has audio sample links, and some include the "Biography" and "Discography" links.

There are three other links on the *musique* page of interest. *World Tracks* is an RFI feature program about world music artists. Hit that link and you'll go to the RFI features page, **www.rfi.fr/actuen/pages/001/page_1.asp** Here you can scroll down to the link for *World Tracks*, and listen to the current program.

The *rfi musique live* icon links to the same *rfi Musique* stream available from the "Listen to RFI" dropdown menu on the homepage and other pages. This link wasn't working at the time, and I resorted to the dropdown menu again to access the music stream. This is identified in the player as *rfi musique en direct.*

The "hear the music" link takes you to a page with a list of links of the recently featured musicians. Click one that interests you, and the album cover and info and a "Listen" link will appear to the left. Punch this for an audio sample from that recording, via the *RFI Musique* player.

Also on the *musique* page, in the vertical menu to the left you can access the artist profiles and bios, etc., plus album reviews and concert dates.

One last bonus for music lovers: From the *musique* page, click "Newsletters" along the orange bar near the top, and you're taken to a simple online form where you can sign up for the *RFI Musique News* email newsletter.

Learn French

Radio France International has developed a novel way of learning their native language. From the English homepage, click "Learn French" in the vertical menu, and you'll land on the *langue française* page, **www.rfi.fr/lfen/statiques/accueil.asp**

Here you'll see a few options for learning French through drama and storytelling, rather than straight language lessons. The most interesting of these appears to be *L'affaire du coffret*,

a bilingual crime serial. As the RFI website says, "Follow the adventures of Lucas, a British journalist in Paris. Is he an accomplice or a victim? He decides to trust no-one and to carry out a private investigation: Rather a tall order for someone who has lost his memory and doesn't speak French beyond *bonjour* and *au revoir*."

The mystery begins with the tantalizing line, "It all started one morning when I woke up in a hotel room with the mother of all headaches."

RFI on Satellite

The RFI website gives the following for reception of RFI English broadcasts via satellite:

Galaxy 25: 1200 UTC broadcast only
Hispasat (Channel 2): All 0400-1700 broadcasts.
World Space: 0400, 0500, 1600, and 1700 broadcasts only.

RFI on US AM/FM

If you're on the East Coast, you might be able to receive RFI via FM or mediumwave. The RFI website lists these stations and schedules:

WNYE, Radio New York, 91.5 FM:
RFI Saturday & Sunday, 5:00-9:00 am EST
WUST, New World Radio, Virginia, 1120 AM:
RFI Monday thru Saturday, 7:00-9:00 am EST

The RFI site says these are French language transmissions, but the WNYE website lists French for the full four hours of RFI only on Sunday. Possibly the Saturday broadcast is in English. Elsewhere on the site, RFI is listed for English on Saturday *and* Sunday. The WUST site lists French for RFI, but says its sign-on time is 8:00 am, EST, with RFI French from 8:00-9:00 am EST. For English-only speakers, the French broadcast can still be worth checking for music.

RFI via Cell Phone

If you happen to be in Cameroon or the Ivory Coast, you can hear RFI's latest English broadcast over your cell phone. In Cameroon, dial 9000; in the Ivory Coast, dial 734. Charges are listed as 25F CFA per minute.

RFI via RSS Feed

With all of these listening options, you might be surprised to discover that RFI offers no podcasts in English. For English programming, there is one other option: the RSS feed.

There seems to be no agreed-upon official definition for what RSS stands for, but many consider it to be "Really Simple Syndication." For this service you'll need to download an RSS reader or player. I found the RssReader as a free download.

For RFI's RSS feed, click "RSS" along the red bar near the top of the English homepage, or go there directly: **www.rfi.fr/communen/dynamiques/FluxRSS.aspx?rubrique=actuen**

On this page, click the XML/News link which will bring you the RSS feed address, which is **www.rfi.fr/actuen/pages/001/accueil.xml**

Right click and copy the address and paste it into your RSS reader. On the RssReader, probably the most straightforward way to do this is to simply click "Add" along the RssReader's toolbar, paste the address into the bar that appears in the small window, and click "Next." You may have to click "Next" again, then "Ok" in the "select feed group" window.

In the RssReader, now you'll see RFI's English headlines by date and time in the upper window, and the same headlines in the lower window each with a quick text synopsis. At the end of each synopsis, you can click "Read more" or "Open in browser" for the full story. The former brings up the story and the RFI website in the lower window of the RssReader; the latter opens the webpage in your browser, taking you directly there as a click on your "Favorites" would.

There are various controls and adjustments to play with on the reader, such as the type, date, and keyword filters in the bars along the top. The type filter lets you choose headlines according to age or importance, etc. The date filter offers an editing clock with settings ranging from "All" to "Last 15 minutes" to "Last 96 hours." The keyword filter is more or less a keyword search of the headlines.

Though you can just as well go to the RFI English homepage for the headlines, it is handy to be able to open the RssReader, click the RFI feed under "My feeds," and have recently updated information all in one compact place.

A Shortwave Aside & RFI

Radio France International's long-term lack of a North American English service is now compounded by Deutsche Welle, the BBC, Radio Netherlands, and others dropping their own shortwave English programming for North America. In most of the country, those Caribbean shortwave relay transmitters had probably a 99% reliability for listening: No matter how horrendous the propagation conditions, or how dead the bands, the BBC on 5975 kHz, or Radio Netherlands on 6165 or 9845 kHz, were almost always audible. And under more normal conditions, the reception was nearly perfect.

These broadcasters' decision to drop shortwave in favor of leasing time, mostly on FM public radio stations, gives patchy coverage. Many of these are low-powered, scratchy college stations with limited range. I think it was Glenn Hauser who made the point that this method leaves many

Moustiers Sainte Marie, Upper Provence, photo by Nepomuk

outlying listeners incommunicado. The Caribbean or North American shortwave transmitters provided by far the best coverage per square mile, and with usually a better signal than a hissing, static-ridden FM broadcast.

In addition to a few of these rough FM signals carrying the BBC, in my area I rely on two MW stations for nighttime international broadcast coverage: KOAC 550 kHz in Corvallis, Oregon, carrying the BBC from 9 pm PST Monday through Friday, and from 10 pm PST on Sundays; and CBC Radio One, 1010 kHz in Calgary, Alberta, which carries the BBC, Radio Netherlands, Deutsche Welle, Radio Sweden, Channel Africa, Radio Polonia, Radio Australia, and Radio Prague throughout the local night. (I can also sometimes get CBC Radio One via 690 kHz, Vancouver.) But both of these are subject to noise and long fades, again usually inferior to a good shortwave relay signal.

A lot of this feels like an attempt to force us to the internet for international broadcasts. Some, such as Swiss Radio International, having pulled the plug and put all its focus into its "internet platform," are not even a "radio" anymore. This seems like an effort to transfer costs to the listener: Where we used to be able to hear all of these things with a half-decent battery-operated portable shortwave receiver, we now need a computer, we have to pay monthly fees for internet service, and if we want wireless freedom away from the computer, we have to buy the little local transmitter and receiver so we can hear the streaming throughout the house. So, rather than the broadcasters spending their money on kilowatts and maintenance to transmit on shortwave, we have to spend our money on all the hardware and an internet subscription. It's kind of like satellite radio now – "shortwave" is no longer free.

What are the costs of leasing time on FM and MW public broadcasting stations across the country compared to running (or leasing time on) a shortwave relay station? The message to the international broadcasters is that a solid shortwave relay signal has far better coverage than a conglomerate of weak FM and MW stations, and not everyone has computer or internet access, or wants to, or can, pay for it. A good shortwave signal was the way to reach all listeners in all the nooks and crannies with almost blanket coverage. It was something that wasn't broken and didn't need to be fixed.

In RFI's 2008 press release, they say they have the world's top FM network, with 170 transmitters in 74 countries. And including shortwave and mediumwave, they claim a total of 580 partner stations in 125 countries. With all of this, wouldn't it be a simple matter to bring us a North American English service on shortwave?

Just think, if RFI began a North American English service via French Guiana or other handy relay sight right now, with Deutsche Welle, the BBC, and Radio Netherlands "out of the way," as far as shortwave broadcasts from a Western, free nation goes, they'd almost have a monopoly on

Issoudun Tour Blanche, photo by J. Guilbourt

the North American shortwave listenership. They could do as the BBC used to do on 5975 kHz, and transmit programs for almost the whole of our local evenings here. And lots of us would listen, as an alternative to the Voice of Russia, Radio Havana Cuba, China Radio International, etc.

It's RFI's big chance – right now.

L'anglais pour l'Amérique du Nord, sur les ondes courtes, s'il vous plait.

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Better Audio from Your Shortwave Radio

One of the biggest drawbacks to shortwave listening is the appalling audio. The combination of the poor audio fidelity of the built-in speaker on most shortwave radios plus the audio characteristics of shortwave broadcasting in general makes for tiresome listening. Listening for hours to the tinny sounds of these under-designed speakers results in what's been described as "ear fatigue." And, until Digital Radio Mondiale becomes more widespread, we're stuck trying to get better audio from our shortwave radios.

❖ Computer Speaker Upgrades

One of the cheapest things you can do for better audio is to add computer speakers. They have the advantage of being able to plug into the speaker output or headphone jack of just about any radio. Most are "powered," meaning that they have a built-in audio amplifier so that they can boost the sound of the feeble built-in audio amps found in most computer sound cards. This can be helpful when your shortwave radio is a small portable set.

There's quite a range in price among these types of speakers and, in general, you get what you pay for. Prices are from $12 to $250, and style goes from lowly, plastic-shelled, nondescript speakers to sets

These GE computer speakers sell for under $12 at Target. (Courtesy: Target)

This lavish Bose® Companion Series 3 Series II Multimedia speaker system ($250), also found at Target, features the Bose Acoustimass speaker for deep lows and two satellite speakers on stands to handle the mid-range and highs. Note the "control pod" that lets you control the volume and mute the speakers. (Courtesy: Target)

with stand-alone bass woofers and satellite speakers on stands. There may be no audio advantage to using really cheap computer speakers over the built-in speaker of your radio.

Online streaming varies wildly in audio quality from site to site. In addition, many online streams are so compressed that much of it actually sounds worse than broadcast AM. Good computer speakers may be capable of delivering better audio than you can get online and you may find that they're just the thing to improve the audio of your shortwave receiver. The only way to know is to try it yourself.

❖ Table-top Radio Options

Any radio with an auxiliary audio input can be used as an external speaker for your shortwave radio or favorite online music source. I use a Tivoli Audio Model One, which I reviewed in the March 2001 *MT*. Tivoli is still selling the product, though the price has risen dramatically. Originally available for $100, this model is now $150 and is available from a number of retailers including **www.JR.com** where the shipping, as of this writing, was free.

I use this Tivoli Audio Model One as an external shortwave powered speaker, the audio is excellent, it takes up little space on the desktop and it looks great. (Courtesy: Tivoli Audio)

I like using this radio for an online or shortwave radio speaker upgrade, even though it's monaural (which, of course, doesn't matter for shortwave broadcasts). It's more versatile than stand-alone computer speakers; it does extra duty as an AM/FM desk radio or as the amplifier for an iPod and other MP3 audio source; it has a small desk footprint, and it's a great looking radio!

I've taken the opportunity throughout the last few years, when reviewing table-top radios, to play the computer and shortwave audio through them. One of my favorites was the Cambridge Sound-Works HD820, because it not only had outstanding

audio, it was also capable of HD-Radio reception. Unfortunately, that model is no longer available and many of the other HD-Radio table-top sets currently available are either too pricey or not up to the job of offering best audio fidelity. Some, which I haven't had the chance to use, such as Sony's XDR-S10HDiP, might be up to the task.

Sony's XDR-S10HDiP could be a great candidate for a shortwave powered speaker. It will also do extra duty as an online radio speaker and has HD-Radio reception capability as well as an iPod docking station. It could be an audio bargain at $180. (Courtesy: Sony)

Sony's earlier HD-Radio tabletop set had excellent audio, and this replacement model, though not as handsome in cabinet style as the original, has the features of the earlier model and now includes an iPod docking station. At $180 it could be an excellent candidate for a shortwave radio powered speaker.

❖ Communications Speakers

There are quite a number of external speakers available as after-market add-ons. Some are made to match major shortwave/ham transceiver brands such as Kenwood, Icom and Yaesu. Most are designed for SSB or CW reception and the emphasis is on clarifying the audio, not necessarily on enhancing it. Unlike bookshelf speakers, they don't offer full audio fidelity.

And, they are not cheap. Most are in the $90-200 range and have garnered mixed reviews among hams on **www.eham.net** who are using them for SSB and CW reception. If you have an older, major brand add-on speaker, consider upgrading the speaker itself by replacing the stock 8 Ω 300-5,000 Hz speaker with a more hi-fi speaker of the same size (see photo).

A few after-market speakers have received a majority of good reviews and might be candidates for improved shortwave listening. One such speaker is from Sounds Sweet. It's a rather large (12" x 10" x 10") and hefty (13 pounds) communications speaker that has attracted the attention

Kenwood's SP-23 ($90), Icom's SP-23 Noise-reducing speaker ($185) and Yaesu's SP-8 communications speaker ($160) are examples of brand-name add-on speakers designed to match your Kenwood, Icom or Yaesu radio. (Courtesy: Grove Enterprises and Universal Radio)

of many hams. Some use it to listen to amateur radio as well as shortwave programming. The unit uses a dual cone acoustic suspension speaker with a tuned bass port. At $160 it's not a cheap solution and you'll need plenty of room on your operating desk to accommodate this speaker. To find out more go here: **www.soundssweet.com**

Sounds Sweet communications speaker ($160) can be used for any radio you've got in your shack. Here it's hooked up to a scanner for "hours of fatigue-free listening," according to the web site. (Courtesy: Sounds Sweet)

A much smaller speaker at about the same price is the Gap Hear It speaker. Measuring just 5.25" x 3" x 2.25" it weighs about 1 pound and costs $170. The Gap Hear It has had mixed reviews but would be something to consider if space were at a premium. You can read more about it here: **www.gapantenna.com/hearit_speaker.htm**.

I noticed that hams who have simply adapted various bookshelf speakers have been more pleased with the results than those who paid top dollar for matching speakers for their name brand transceivers. Bookshelf speakers tend to be less expensive and might be a good place to start your quest for better shortwave audio. A few of the ones that have been mentioned as good buys are anything made by Bose, Polk, and Cambridge SoundWorks.

Radio Shack online offers dozens of speakers

These KLH speakers were found on sale at Radio Shack for $39. (Courtesy: Radio Shack)

ranging from expensive woofers to shelf speakers, including indoor/outdoor, ceiling mounted and in-wall models from $800 down to $30. Keep an eye out for sale items and look at the specs. On some of the cheaper models there are no audio frequency response specs listed.

Before you buy, check out the customer reviews available on most retail web sites and read the reviews on **eham.net**. While hearing is a very subjective matter, there are some universal comments on some models that are worth paying attention to as a consumer.

❖ The FM Conversion Approach

The biggest problem with the add-on speaker approach is that you're stuck sitting around the radio listening. What if you want to be doing something else, like cooking dinner or sitting in a more comfortable place? The answer is C. Crane's excellent FM transmitter. At $69 it's a good bargain. But, I've found that there's often an "orphan" FM transmitter available on their web site at $49. Don't hesitate to take the orphan. These units carry the same warranty and are usually just product returns from customers who may have been unhappy that these transmitters don't exceed their FCC certification.

C. Crane's FM transmitter converts dismal shortwave radio audio into decent FM audio and lets you listen anywhere in the house on any stereo, portable or tabletop radio. (Courtesy: C. Crane)

I've found that C. Crane transmitters can reach in most directions, depending on the number and type of walls the signal has to go through, about 50 ft. away. That's enough to be picked up by any radio in any room in the house and easily picked up on an FM headset, even outdoors. I tune in my transmitter on a big stereo with 5.1 surround sound. Well, at least the audio is coming out of all the speakers and it sounds great.

Thanks to Sirius/XM satellite radio, there is a huge market in low cost, very low power FM modulators. Most, however, don't have the features of the C.Crane transmitter: 11-inch whip antenna, input level control (to prevent audio distortion), auto-off feature, accurate digital tuning, coiled connector plug with mini-plug and your choice of battery operation or included wall plug transformer. Many satellite radio FM modulators don't have an external power supply. They won't

stay powered long on batteries, so you'll have to make your own power supply. Figure that into your cost and you'll soon be calling C. Crane to place your order.

❖ Last Word

No amount of audio trickery can make up for a lack of propagation and a dismal solar cycle. Not all stations are equal in their audio – some seem to transmit too many highs, others too much bass. Still, what stations do come through, whether full-width AM broadcasts on shortwave or just your local 80 meter SSB rag chew net, the audio will be improved considerably by using a better speaker.

And, for a real retro-treat, check out the AM amateur radio frequency chart below. You'll hear some outstanding AM amateur radio operators, many running vintage equipment that still sound sweet. You'll hear others operating modern gear in AM mode, and they can sound great, too.

You'll also be amazed at how much easier it is to listen to communications on your scanner or 2 meter HT. I found that even my local NOAA WX radio station sounded better. So, stop hurting your ears and start enjoying your hobby.

Enjoy Old-Time AM Amateur Radio on These Frequencies

80 Meters	3.885 MHz	(AM calling frequency)
40 Meters	7.290 MHz	(AM calling frequency)
20 Meters	14.286 MHz	(AM calling frequency)
10 Meters	29.000-29.200	(AM will be heard between these frequencies, many vintage rigs, modern rigs and converted CB sets are heard when the band is open)

GLOBALNET

Exploring the World of Internet Radio and Television

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Want your iTV?

While radio hobbyists and streaming enthusiasts have a plethora of choices from which to scour every last source of audio programming from the depths of the World Wide Web, those looking for streaming television have to dig a little deeper and have a bit more knowledge of what to look for.

At this time, you just aren't going to be able to log on to your favorite television station's website and see live streaming video 24/7, at least not in the United States. There are too many issues with advertising and programming content that prevent that.

Sure, when big news breaks or the weather turns severe, your local station might decide to place a live stream on their website, so it is a good idea to go ahead and bookmark the websites of the stations in your market or city. But what do you do when you want content right now, when all is well in the world and the sky is blue? What about content from other parts of the globe?

There are other places on the Web you can go, some more legitimate than others, to find streaming video content. You just have to know where to look.

CHANNELCHOOSER.COM

A good place to start looking for streaming television stations around the world is **www.ChannelChooser.com.** The site claims nearly 3500 streaming stations as of press time, from countries all around the world.

I decided to begin my test in Latin America and found several television stations up and running in Costa Rica, including an all music channel. Next, I headed to Africa and was watching soap operas in Egypt.

Not all of the links to each country's stations will take you directly to a stream. Some are to websites where you can stream recorded news. I found that by going to the "General TV" stations, you were more likely to find live streaming video.

Those looking for streaming U.S. broadcast stations will find an assortment of stations listed (Tip: look for the "next" links in the bottom right corner of the page), but most of these are links to websites where you can view recorded news, weather, etc.

From some of my searching on ChannelChooser, I noticed one website that kept popping up when I clicked on the video links, so I decided to check it out...

JUSTIN.TV

www.Justin.tv proclaims itself as "*the* place for live video." There certainly is a lot, though not all of them are streaming television stations. Many of the "channels" amount to live "vodcasts" (think of it as a video podcast).

Hobbyists will be happy to know that in my initial browsing, I even found links to what appeared to be live scanner feeds (Scan Massachusetts). I heard several calls go out during my listening session for EMS, Boston Police, etc. This was an encouraging find, so I decided to probe further. I found at least two other streaming

scanner feeds on Justin.tv, both in Illinois.

Some radio stations even stream their live studio web cams on Justin.tv. A quick search for a few known TV stations both in the U.S. and abroad didn't turn up any hits, but I know there are some to be found; you just might have to dig a bit to find them.

WWITV

Like Channel Chooser, **www.WWITV.com** claims to host more than 3000 streams of television stations from around the globe.

The page is relatively easy to navigate (actually, a bit easier than ChannelChooser). The countries are listed down the left hand side of the page.

I found (and this also holds true for ChannelChooser) that the less developed countries have more live streaming video. Many of the larger developed countries (U.S., U.K., Australia, etc.) have mostly recorded news and excerpts, whereas many of the African, Latin American and Middle Eastern countries have live streams of all programming. Again, those of you who don't mind digging a little bit will be the ones to find the true gems.

Occasionally, I ran into a stream that was hosted externally and required RealPlayer to view. One such example was RCTI in Indonesia.

Be aware that you will sometimes be told a stream isn't currently active, presumably because the station is off the air. For a few of these, I checked back during their local daytime hours and the streams seemed to be working fine.

TVCHANNELSFREE

Another good source was **www.TVChannelsFree.com**. This site also allows you to sort stations by country, and in no time, I was watching live content from Peru, Serbia and Vietnam, even

New Channels Egypt

Channel	Description	Views	Added ▼	Rating
MBC	General TV channel.	474	06/22/09 11:31 AM	★★★☆☆
Sat 7 Pars	No description available.	840	04/07/09 11:40 AM	☆☆☆☆☆
Sat 7 Kids	TV for children.	805	04/07/09 11:40 AM	☆☆☆☆☆
Nile TV	Egypt State Information Service.	1351	04/07/09 11:40 AM	☆☆☆☆☆
Nile News	Recorded news.	711	04/07/09 11:40 AM	★★★☆☆
Nile TV International	General TV channel.	2303	02/20/09 01:04 PM	★★☆☆☆
Al Resalah	Satellite channel.	1930	02/20/09 02:54 AM	★★☆☆☆

Showing 1 to 7 from 7 TV channels

webcams overlooking Australian beaches.

The thing about TVChannelsFree that struck me was that the streams seemed to load faster than on any of the other sites I had visited. When you load a stream, it will be in a small video size, but a simple double click on the video will enlarge it to full screen size for optimal viewing.

SQUIDTV

A favorite source for streaming television links across the globe was http://watch.SquidTV. net. SquidTV uses a little more intuitive map navigation: Just click on the link for the region of the globe from which you want to view TV stations, pick a country from that region, pick a TV station from that country, and you are up and running.

Using SquidTV, I was watching live streaming television from Kuwait's state-owned KTV 1. While I didn't understand much of what was being said, just watching local programming from half a world away was fascinating. It was everything about DXing that I grew up loving, just without the pesky atmospheric conditions to contend with.

SquidTV allowed me to successfully access streaming video from the largest number of countries. I watched streaming television stations (and in some cases, multiple stations) from Russia, Poland, Norway, Saudi Arabia, Aruba and Ecuador.

As with WWITV, I recommend making sure you have the latest versions of both RealPlayer and Windows Media Player, as you will find most streams utilize one or the other.

For countries like the U.S., U.K., Australia, Ireland, etc., you may not be able to find much in the way of live streaming video. But those of you who live in these countries may already have a streaming television source at hand, as explained below.

THE "PLAYERS"

For those who live in the U.K., the BBC iPlayer is your one stop source. Technically, the BBC iPlayer doesn't provide you with live streaming video, but it does give you the chance to catch up on all of your favorite programs from each of

the BBC television stations.

The same type of one-stop source is available to those looking for content from Ireland's RTE. You will have to reside in Northern Ireland or in the Republic of Ireland in order to view the RTE Player.

On the other hand, ABC Television in Australia has an iView player that, at least as of press time, did not seem to have any geographical barriers. I watched a nice program of the band Erasure from the BBC using ABC. Because of the highly interactive design and high-bandwidth content, a reasonably fast Internet connection is recommended.

❖ The Bottom Line

Be prepared, in your search for streaming television stations, to find a lot of broken links, a lot of slow connections, and in some cases, being prevented from seeing the streams because of where you live.

But be diligent: there is a wide range of content available on the Web for those willing to look for it. Those looking for streams in smaller or more remote countries might actually have better luck than those looking for streams from more industrialized countries that have more stations. In general, I found that those countries with state-run stations were more likely to have streams available, but there were exceptions.

All-in-all, streaming video can be another rewarding experience for those looking to "DX" the Internet for programming content from around the world.

❖ A Webcaster Deal Struck?

It is hardly ideal from the independent webcaster's vantage point, but a temporary deal seems to be in place to settle the long disputed royalty fees associated with operating an Internet radio station that plays music.

While the new royalty deal, good for about the next five years, brings royalty rates lower than initially proposed, the smaller independent webcasters may be the ones left without a chair when this music stopped.

The new deal says that all online stations must pay a minimum $25,000 fee that can be applied to total royalty payments. In addition, large webcasters (those making more than $1.25 million in revenues) will pay either 25 percent of their rev-

enue or a per-performance rate of approximately a tenth of a cent, whichever is greater. Smaller webcasters (those making less than $1.25 million a year in revenue and fewer than between 8 and 10 million listener-hours per month) can either pay 12 percent of the first $250,000 in revenues, then 14 percent of additional revenues, or 7 percent of their expenses.

On top of that, webcasters now have to give detailed information about the songs they are playing and how many users are listening to them.

In addition to basically making independent webcasting stations unaffordable to the everyday hobbyist, there are some worries that bigger music sites like Pandora might have to begin charging if a user listens to their service a lot.

So, if you had a dream of starting a small online radio station, you can still pursue that dream; just be ready to pony up some serious amounts of cash to do it.

SCANNING REPORT

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"Open" and Shut Systems

There are a lot of different scanner models on the market, with new ones coming out on a regular basis. Selecting a model that will work for the systems you'd like to monitor can be a challenge, especially when new systems become operational in your area.

❖ York County, South Carolina

Hello Dan,

I'm trying to find out just what receivers will work (and won't) for our relatively new county trunking system. I didn't know if you could look it up or not – I have some information about it. It is a Project 25 standard system with an Apco-25 common air interface.

I am located in Rock Hill, South Carolina.
Barnes in South Carolina

Rock Hill is a town of about 65,000 residents located in eastern York County, South Carolina. York County borders North Carolina and is home to nearly 220,000 people, covering an area of almost 700 square miles.

In December of 2004 the York County Council approved the purchase of a $23.6 million radio system from Motorola, which included an 800 MHz voice and data trunked radio network and a 900 MHz paging system. The new system came on-line less than two years ago and replaced the 1970's-era analog equipment that had become difficult and expensive to maintain. It now serves more than 300 personnel, including 150 patrol and response officers.

Project 25 Systems

The trunked radio network uses the APCO (Association of Public Safety Communications Officials) Project 25 standards for both the air interface and the control channel, making it a "pure" P-25 system. All P-25 systems use the same Common Air Interface (CAI) protocol between radios and repeater sites, but there are variations in how a P-25 system might be trunked.

If a P-25 system is not trunked, it is "conventional" and can be monitored by any scanner with Project 25 capability, going back to the first digital-capable scanners introduced by Uniden in 2002.

If a P-25 system is trunked, it uses a separate *control channel* to communicate talkgroup and frequency information between radios and repeater sites. This control channel will follow one of two standards, depending on whether it is a "mixed" system or a "pure" system.

The first, older standard was originally developed by Motorola and carries information at a rate of 3,600 bits per second. It is used on analog trunked systems as well as systems carrying a mixture of both analog and digital voice traffic. As with conventional P-25, any digital-capable trunk-tracking scanner can follow the activity on this control channel.

The second standard is unique to Project 25 and is found only on systems that carry all voice traffic in the CAI digital form. A P-25 control channel carries data at the rate of 9,600 bits per second and can be monitored only by subsequent generations of digital-capable scanners. Because first generation digital-capable scanners are only able to track activity on a 3600-baud control channel, using one on a "pure" P-25 system will not be successful.

Scanners capable of monitoring the 9600-bps P25 control channel include the following models:

Scanners Capable of Monitoring "Pure" P-25 Systems

Manufacturer/Supplier	Models
GRE	PSR-500, PSR-600
Radio Shack	PRO-106, PRO-197
	PRO-96, PRO-2096
Uniden	BCD396XT
	BCD396T, BCD996T
	BC-296D, BC-796D

The York County system has nine repeater sites and supports 40 agencies and about 2,500 radios. It uses the following frequencies: 866.0625, 866.1125, 866.3625, 866.6125, 866.6375, 866.8375, 867.1500, 867.3375, 867.7125, 867.9750, 868.2000, 868.3875, 868.5000, 868.6000 and 868.7750 MHz.

Decimal	Hex	Description
49536	C180	York County Mutual Aid (EMS)
49537	C181	York County Mutual Aid (Fire)
49550	C18E	County Sheriff (Dispatch)
49551	C18F	County Sheriff Tactical 2
49552	C190	County Sheriff Tactical 3
49553	C191	County Sheriff Detectives 1
49554	C192	County Sheriff (Process Service)
49555	C193	County Sheriff Detention Center
49556	C194	County Sheriff Administration
49557	C195	County Sheriff Special Operations 1
49558	C196	County Sheriff Special Operations 2
49559	C197	County Sheriff Lake Patrol
49560	C198	County Sheriff Command Staff
49561	C199	County Sheriff Emergency
49562	C19A	County Sheriff Conference 1
49563	C19B	County Sheriff Conference 2
49564	C19C	County Sheriff Training 1
49565	C19D	County Sheriff Training 2
49566	C19E	County Sheriff Constables
49567	C19F	County Sheriff Court Security
49568	C1A0	County Sheriff SWAT 1
49569	C1A1	County Sheriff SWAT 2
49570	C1A2	County Sheriff SWAT Conference
49571	C1A3	County Sheriff Solicitor
49572	C1A4	County Sheriff Narcotics Enforcement
49573	C1A5	County Sheriff Narcotics Enforcement
49574	C1A6	County Sheriff Narcotics Enforcement
49575	C1A7	County Sheriff Forensic Service Unit
49601	C1C1	County Fire (Dispatch)
49602	C1C2	County Fire Operations 2
49603	C1C3	County Fire Operations 3
49604	C1C4	County Fire Operations 4
49605	C1C5	County Fire Operations 5
49606	C1C6	County Fire Operations 6
49607	C1C7	County Fire Operations 7
49608	C1C8	County Fire Operations 8
49609	C1C9	County Fire Operations 9
49610	C1CA	County Fire Conference 1
49611	C1CB	County Fire Conference 2
49612	C1CC	County Fire Prevention Administration
49613	C1CD	County Fire Prevention Operations
49614	C1CE	County Fire Prevention Conference
49649	C1F1	County Coroner
49650	C1F2	County Emergency Medical Services (Dispatch)
49651	C1F3	County Medical Operations 2
49652	C1F4	County Medical Operations 3
49653	C1F5	County Medical Operations 4
49654	C1F6	County Medical Operations 5
49655	C1F7	County Rescue Operations 1
49656	C1F8	County Rescue Operations 2
49657	C1F9	County Medical to Piedmont Medical Center
49658	C1FA	County Medical to Fort Mill Emergency Room
49659	C1FB	County Medical Conference 1
49660	C1FC	County Medical Administration
49661	C1FD	County Medical Emergency
49680	C210	County Public Works (Main)
49681	C211	County Animal Control (Dispatch)
49682	C212	County Jail Operations
49683	C213	County Road Maintenance Department

49684	C214	County Solid Waste Collection/Recycling
49685	C215	County Waste Disposal
49686	C216	County Water and Sewer Department
49687	C217	County Public Works
49688	C218	Ebenezer Park
49689	C219	County Public Works Engineering
49690	C21A	County Public Works Equipment Maintenance
49691	C21B	County Management Information Systems
49692	C21C	County Planning and Development
49693	C21D	County Building and Codes
49751	C257	Emergency Management Operations 1
49752	C258	Emergency Management Operations 2
49753	C259	Emergency Management Operations 3
49754	C25A	Emergency Management Administration
49755	C25B	Emergency Management Conference
49801	C289	Rock Hill Police (Dispatch)
49802	C28A	Rock Hill Police Patrol 2
49803	C28B	Rock Hill Police Patrol 3
49804	C28C	Rock Hill Police Street Crimes Unit
49805	C28D	Rock Hill Police Conference 1
49806	C28E	Rock Hill Police Conference Common
49807	C28F	Rock Hill Police Criminal Investigations Division
49808	C290	Rock Hill Police Support Service Division
49809	C291	Rock Hill Police Command
49810	C292	Rock Hill Police Internal Affairs
49811	C293	Rock Hill Police Emergency
49812	C294	Rock Hill Police SWAT 1
49813	C295	Rock Hill Police Special Operations 1
49814	C296	Rock Hill Police Special Operations 2
49815	C297	Rock Hill Police Training 1
49816	C298	Rock Hill Police Training 2
49817	C299	Rock Hill Police Bomb Squad
49831	C2A7	Rock Hill Fire (Dispatch)
49832	C2A8	Rock Hill Fire Operations 2
49833	C2A9	Rock Hill Fire Operations 3
49834	C2AA	Rock Hill Fire Operations 4
49835	C2AB	Rock Hill Fire Operations 5
49836	C2AC	Rock Hill Fire Operations 6
49837	C2AD	Rock Hill Fire Operations 7
49838	C2AE	Rock Hill Fire Conference 1
49839	C2AF	Rock Hill Fire Administration
49840	C2B0	Rock Hill Fire Command
49841	C2B1	Rock Hill Fire Inspectors
49851	C2BB	Rock Hill Public Works 1
49852	C2BC	Rock Hill Public Works 2
49853	C2BD	Rock Hill Public Works 3
49854	C2BE	Rock Hill Public Works 4
49855	C2BF	Rock Hill Public Works 5
49856	C2C0	Rock Hill Parks, Recreation and Tourism
49857	C2C1	Rock Hill Homeland Security
49858	C2C2	Rock Hill Administration
49859	C2C3	Rock Hill Emergency

You may also want to check the following conventional (non-trunked) frequencies for analog voice and data activity.

Frequency	Description
154.115	Rock Hill Police
154.755	Rock Hill Police (Dispatch)
154.890	Rock Hill Police (Car-to-Car)
154.965	Rock Hill Police
154.935	Rock Hill Police
155.610	Rock Hill Police (Alternate)
155.715	Rock Hill Police
159.090	Rock Hill Police
453.0875	Rock Hill Police
453.1500	Rock Hill Utilities (Primary)
453.5500	Rock Hill Fire (Dispatch)
460.2000	Rock Hill Public Works
460.3750	Rock Hill Utilities (Secondary)
860.7125	Rock Hill Police Mobile Data Terminals (Data)

❖ Suburban Chicagoland

We've covered the trials and tribulations of the OpenSky radio network product in previous columns, including trouble in Milwaukee and New York's high profile contract cancelation of their statewide system earlier this year. Open-Sky was part of M/A-COM's Wireless Systems Segment, which was sold to Harris this past May for $675 million. It will be interesting to see if Harris can succeed with OpenSky where M/A-COM could not.

Despite the problems other jurisdictions have experienced, the suburban Chicago cities of Aurora and Naperville are moving ahead with their purchase and installation of a joint OpenSky system.

Aurora and Naperville are adjoining cities located about 40 miles west of Chicago with a combined population of more than 300,000 residents and a total area of nearly 80 square miles.

Aurora's most historic landmark is the Leland Tower, a 22-story building that was once the tallest building in Illinois outside of Chicago. The city is also the home of fictional characters Wayne and Garth from the 1992 film "Wayne's World." Aurora's fire department was formally established in 1856 and celebrated its 150th anniversary in 2006.

Naperville, located just east of Aurora, in 2006 was voted the second-best small city to live in by *Money* magazine and has a number of high-tech businesses including Bell Labs, ConAgra, Laidlaw, OfficeMax and Tellabs. For cold war historians, a 47-acre park and office complex in northern Naperville was once Nike missile battery site C-70, part of a 1950's-era Chicago air defense perimeter.

Aurora's current public safety radio system is 13 years old and Naperville's is nearly 20 years old, described by the Police Chief as "broken." Because of the close physical proximity and regular mutual aid operations between the two, the cities decided to go in together on twin interoperable radio systems that are able to back each other up if either should go down.

The OpenSky contract, approved by both cities late last year, involved a two-year bidding process and a final price tag of $26 million. Motorola, the

runner-up in the process, came in with a $30 million proposal that was ultimately rejected. There was also some controversy regarding allegations that Motorola, realizing they were going to lose the sale, contacted city council members individually at the last minute to try and sway or delay the final decision.

StarCom21

Another option for the cities that was also rejected was the proposal to use the existing StarCom21 system, a statewide public safety radio network owned and operated by Motorola on behalf of Illinois. Used primarily by the Illinois State Police (ISP) and the Illinois State Highway Authority (ISHA), any public safety agency in the state is eligible to join the system.

StarCom21 is a "pure" APCO Project 25 system, with digital voice and a 9600 bps control channel. It uses 186 repeater sites across the state and provides coverage for the Aurora/Naperville via three separate towers.

However, StarCom21 was originally designed to provide adequate service for mobile (vehicle-mounted) radios. Compared to the portable (handheld) radios carried by police and firefighters when working the scene of an incident or emergency, the mobiles have better antennas, more transmit power, and a less cluttered signal path to the repeater site.

Officials from both cities were concerned that the StarCom21 system lacked good in-building coverage in their downtown areas and would place their personnel at risk because they would not be able to communicate reliably inside buildings, basements, or other shielded structures. Reports from the cities show that three-quarters of their radio communications take place on portable radios.

The OpenSky system promises to provide much better coverage for portable radios, due to additional repeater sites tuned specifically to the needs of the cities.

Joining StarCom21 would also have required that each city surrender all of their frequencies to the State and rely on Motorola to operate and maintain the technical aspects of the system. Aurora and Naperville both agreed that such an outcome was too risky should StarCom21 prove inadequate to meet their needs.

Transition to OpenSky

The cities originally hoped to have the new system up and operating by the summer of 2010, but have adopted a more aggressive schedule that includes final acceptance testing in September and to be fully operational by the end of the year.

Unfortunately, there is no scanner on the market that is able to monitor OpenSky systems, so hobbyists, journalists, and even off-duty city employees will be left in the dark about what is happening in Aurora and Naperville.

Aurora, Illinois

The City of Aurora currently operates a Mo-

torola Type II analog trunked radio system, carrying traffic for the city as well as the village of North Aurora. It uses the following frequencies: 866.0375, 866.0625, 867.2500, 867.6250, 868.1750, 868.2000 and 868.5375 MHz.

Decimal	Hex	Description
16	001	Aurora Water and Sewer Departments
48	003	Aurora Equipment Services
80	005	Aurora Streets and Sanitation
112	007	Aurora Zoning and Animal Control
144	009	Aurora Water and Sewer Supervisors
176	00B	Aurora City Special Events
208	00D	Aurora Citywide
1616	065	Aurora Police Tactical
1648	067	Aurora Police (Dispatch)
1744	06D	Aurora Police (Car-to-Car)
1776	06F	Aurora Police Operations 1
1808	071	Aurora Police Operations 2
1840	073	Aurora Police
1872	075	Aurora Police (Supervisors)
1904	077	Aurora Police Tactical 1
1936	079	Aurora Police Tactical 2
1968	07B	Aurora Police Tactical 3
3248	0CB	Aurora Fire (Dispatch)
3280	0CD	Aurora Fireground 1
3312	0CF	Aurora Fireground 2
3344	0D1	Aurora Fireground 3
3408	0D5	Emergency Medical Services link to Mercy Hospital
3440	0D7	Emergency Medical Services link to Copley Hospital
3696	0E7	North Aurora Fire (Dispatch)
4816	12D	Aurora Emergency Operations
6416	191	North Aurora Public Works
8016	1F5	North Aurora Police Department 2
8048	1F7	North Aurora Police Department 1

Naperville, Illinois

Like Aurora, Naperville also currently operates a Motorola Type II analog trunked radio system. It uses 864.1875, 866.2375, 866.6250, 867.0375, 867.2000, 867.5750, 867.8250, 868.1500 and 868.6500 MHz.

Decimal	Hex	Description
80	005	Police 1 (Dispatch)
112	007	Police 2
144	009	Police Records Inquiry
176	00B	Police Tactical
208	00D	Police Detectives
240	00F	Police Administration
272	011	Police Detail 1
304	013	Police Detail 2
336	015	Patch to ISPERN (155.475 MHz)
1680	069	Fire (Dispatch)

1712	06B	Fireground
1744	06D	Fire Administration
1776	06F	Patch to MERCI (155.340 MHz)
3280	0CD	Electric Department
3312	0CF	Street Department
3344	0D1	Water Department
3376	0D3	Emergency Services and Disaster Agency (ESDA) 2
3408	0D5	Emergency Services and Disaster Agency (ESDA) 1
3472	0D9	Building Maintenance 1
3504	0DB	Building Maintenance 2
3536	0DD	Radio Technicians
3568	0DF	Patch to IFERN (154.265 MHz)
3632	0E3	Fire Training
3664	0E5	Patch to Fireground (153.830 MHz)
3600	0E1	Zoning Department

Note that Naperville has several "patches" to various VHF frequencies. These allow users to communicate with mutual aid and other outside agencies without needing a separate radio. It would be reasonable to expect that the new OpenSky system would have a similar capability.

Illinois Mutual Aid Frequencies

The VHF patched frequencies listed below are dedicated to mutual aid and transmissions always carry voice traffic in analog format. They are set aside in Illinois to provide a simple, straightforward way for different departments and agencies to easily communicate with each other.

Chicagoland listeners report that ISPERN and IFERN are rebroadcast by the DuPage Public Safety Communications ("DuComm"). You can hear ISPERN on 470.4375 MHz and IFERN on 470.3625 MHz.

That's all for this month. You can get more frequencies and radio-related information, including details on OpenSky systems across the country, on my website at **www.signalharbor.com**. I welcome your comments, questions and reception reports via electronic mail at *danveeneman@monitoringtimes.com*. Until next month, happy scanning!

IFERN	Interagency Fire Emergency Radio Network	154.265
IFERN2	Interagency Fire Emergency Radio Network (Alternate)	154.3025
IREACH	Illinois Radio Emergency Assistance Channel	155.055
ISPERN	Illinois State Police Emergency Radio Network	155.475
MABAS	Mutual Aid Box Alarm System (Red Fireground)	153.830
MABAS	Mutual Aid Box Alarm System (White Fireground)	154.280
MABAS	Mutual Aid Box Alarm System (Blue Fireground)	154.295
MABAS	Mutual Aid Box Alarm System (Gold Fireground)	153.8375
MABAS	Mutual Aid Box Alarm System (Black Fireground)	154.2725
MABAS	Mutual Aid Box Alarm System (Gray Fireground)	154.2875
MERCI	Medical Emergency Radio Channel for Illinois	155.340

Q. *I've had radios with TV audio for years, starting with a Lafayette model in the late '60s. Currently I use a Radio Shack version of the GE Super Radio daily. Will any radios be available after the switch to digital? (George, WB2GTC)*

A. None, as yet, has even been announced as being in development. TV and FM broadcasting took many years to be included in AM/FM portable radios. I suspect it will be quite a while before digital TV audio reception will be included in our otherwise-analog portable radios.

Q. *I am using RG-174/U coax on an antenna. What do these letters mean? Can I use the coax outdoors? (Ron, email)*

A. RG stands for "Radio Guide," a reference to coaxial cables developed during WWII. U simply means "Universal," referring to its general applicability.

Yes, RG-174/U is outdoor-rated. Like any coax, however, sunlight will gradually degrade the vinyl insulation over a period of years.

Q. *A recent TV news report discussed a controversial plan by our government to intercept private phone calls from possible terrorists. In the background was a 20 foot dish antenna. Is it possible to monitor phone calls made overseas? I thought cell phones had a limited range (unless by satellite). (Alvin Dattner, email)*

A. Overhearing telephone calls is nowhere nearly as simple these days as it once was. The vast majority (if not all) of the links are now digitized, and it requires the cooperation of the common carriers (wireless telephone companies) to enable monitoring.

Cordless and cellular telephone calls are now in the UHF range, and long distance service is by digitized fiber optic networks. UHF has very limited range; chances are that dish is an attempt to intercept downlinks from satellites which carry overseas traffic as well as domestic, then decode their digitized conversations. Many of these digital systems use proprietary codes, so it's not a matter of simply "tuning in."

Q. *I am trying to receive an 800 MHz trunking system that's about 90 miles away, but can't hear a thing. I have a Grove Scanner Beam mounted outdoors. What might be the problem? (Gene Stewart, email)*

A. I generally figure that 800 MHz signals from base stations reach about 50-75 miles maximum under the best conditions. Assuming the antenna is just fine and pointed properly, here are some of the negative variables:

- Intervening buildings, hills, trees
- Losses in a long length of cheap coax cable
- Defective balun transformer
- Wet weather
- Trying to hear digital communications on an analog scanner
- Desensitization of the scanner from nearby, strong-signal overload

While the Scanner Beam is an excellent, general purpose, scanner antenna, a dedicated 800 MHz beam antenna like the WiNRADiO log periodic with the built-in preamplifier should work much better on that specific range.

For deep fringe improvement, LMR-400 coaxial cable is the best choice, but lower-cost RG-6/U coax is usually adequate for shorter runs (under 100 feet).

Q. *I am seriously considering buying an IcomR-75, but before I spend this much I would like to know how all of this digital upgrade is going to affect shortwave listening? (R.C. Moyers, email)*

A. The digital mode which you are referring to is Digital Radio Mondiale (DRM), and its slow evolution will not impede your enjoyment of normal shortwave broadcasting, nor will it have any effect on utility monitoring (SSB).

Current DRM is being sent right along with conventional AM broadcasting. Until DRM broadcasts carry unique programming, you don't even need the DRM capability to make sure you are receiving all the content that is being broadcast.

Q. *When I'm out making the rounds of thrift shops looking for electronic bargains, I often see stereo speakers. Is there a* simple test that I can make to get an idea of whether they will provide decent sound?

A. Since it's unlikely that you will be carrying a high-powered, sweep-tone generator with you, let's just do the basic tests which will give a valid indication of whether or not the speaker is worth considering.

Visually, if the speaker cone is just a few inches in diameter, it will probably serve just fine for voice, Morse and data reception; a larger speaker provides the bass for music.

Carry with you a nine-volt battery to touch briefly across the speaker terminals (it won't harm the speaker). If the sound is just a raspy click, it should work for those modes. If it provides a good, bassy "thump" as well, it should work well with music.

Now inspect it for damage. If the speaker is enclosed in a wood cabinet behind a grill, you should be able to pull the grill off; it is often on a separate frame with small plugs which detach from the cabinet. This is usually revealed by lightly prying the edges of the grill to observe movement.

Inspect the paper cone to be sure it isn't torn, and that the rubber surround which attaches the cone to the frame isn't crumbling and disintegrating; this damage is *very* common on thrift-shop speakers! While a minor paper tear on the cone can often be repaired with tape, rubber glue or contact cement, the rubber surround can't.

If the cone and surround look good, press gently in on both sides of the cone and listen for it to rub the magnet; it should move without scraping.

These easy tests should do the trick.

Q. *Does the GRE PSR-500 support narrow-band reception by switching in an additional, narrower IF filter? (Gary Kinsman, email)*

A. I don't find any reference to switching between conventional and narrow FM filters for the new narrow-band channels. It is my understanding that the radios simply employ automatic gain control (AGC) for the audio so that both standard and narrow FM deviations produce the same audio level from the speaker.

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"Spy" Numbers:
The Global Intrigue Continues

We really didn't need any more proof that the Cuban "numbers" broadcasts were aimed at deep-cover operatives in the United States. However, yet another FBI "Cuban spy" arrest has focused media attention on their espionage role.

On June 4, the US government filed charges against Walter Kendall Meyers, a retired State Department official, and his wife Gwendolyn. Both were accused of long-time spying for Cuba. They were held without bail as flight risks.

As in at least three previous such cases, much of the key evidence cited by the government involves the alleged use of clandestine short wave radio messages from Cuba. These are the same numbers broadcasts that we hear daily – V02 and M08 (the designators given by ENIGMA 2000, the European Numbers Information Gathering and Monitoring Association).

❖ The Meyers Case

This latest "spy bust" may well be the strangest yet. Walter Kendall Myers, age 72, appears to be a distant descendent of Alexander Graham Bell. At the start of World War II, Meyers was a recognized expert in British affairs, though he argued in favor of Chamberlain's failed "appeasement" policy. Like a lot of people in that era, he learned the Morse code.

Later on, Meyers and his wife were allegedly recruited by the Cuban intelligence department. It is charged that they were instructed to find sensitive government positions with access to classified documents. According to the St. Petersburg (FL) *Times*, Walter was turned down by the CIA, but found a job in the State Department, where he had worked before.

According to Voice of America News, Myers is alleged to have seen at least 200 sensitive documents regarding Cuba. Another news story, in the Los Angeles *Times*, alleges that Gwendolyn made document drops in supermarket shopping carts until she became concerned about surveillance cameras. After that, she is said to have sent information from Internet cafes.

❖ Cuban Intelligence

Cuban human intelligence (HUMINT) is under the control of the DI. This is a Spanish acronym for Dirección de Inteligencia, or Intelligence Directorate. It was formerly named the DGI (Dirección General de Inteligencia, or General Intelligence Directorate). This is how you'll usually see it in short wave publications.

Flag of Cuba

All these high-profile arrests begin to reveal the wide scope of Cuban espionage. News stories usually quote Chris Simmons. He's a former US counter-intelligence official who helped investigate some previous cases.

Simmons always says that the Cuban intelligence operation should not be underestimated. Despite Cuba's small size, and its policy of not paying agents, it supports a surprisingly large number of deep-cover recruits and their handlers. As we have seen, these have burrowed into a lot of very sensitive places. They appear to be after any classified documents at all, for sale to whoever wants them.
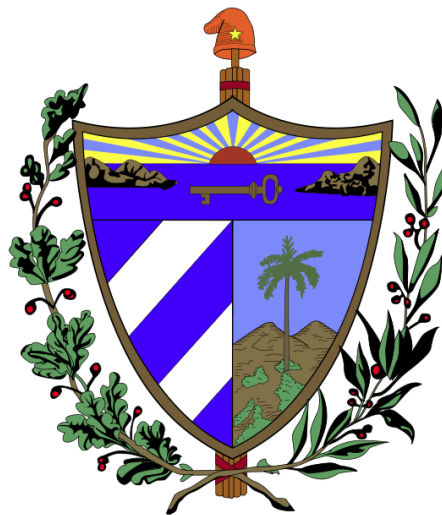
The Cuban coat of arms, designed in the 19th century

This wide scope might explain the sheer size of the Cuban numbers operation, which maintains one of the world's largest schedules. If the engineers are low-paid, which is likely, that would also help explain its notorious sloppiness.

While most broadcasts come from a couple of sites near Havana, other transmitters have been uncovered. One relay of M08a, a three-message Morse format, used a frequency in the center of the popular 30-meter ham band. Schedules were late at night, when few hams were transmitting, and the station really stood out. The lack of multiple propagation paths also made triangulations pretty reliable. Several people nailed the location as somewhere in central Pennsylvania. After this story broke in *Monitoring Times* in October 2006, the station quickly went somewhere less conspicuous. It is now sporadically active on a higher frequency.

❖ The Spies are Listening

As in at least three previous cases, alleged evidence in the Meyers case specifically mentions the reception of the Cuban numbers broadcasts. The relevant sections of the criminal charges have been posted to the Shortwave Central blog at **http://mt-shortwave.blogspot.com/2009/06/cuban-spy-update.html**.

Section 34 specifically mentions the use of "a decryption program" to "decode the seemingly random series of numbers" broadcast "on a particular shortwave frequency." Section 36 specifically cites "encrypted radio messages in Morse code" (M08) and "voice." (V02).

Farther down, it is claimed that the Meyers and their handler all had specific code numbers to identify messages for them. These would have been passed in the V02 or M08 callup at the beginning of the transmissions. The voice starts with "Atención" (Attention!). Voice and Morse both have message identifier groups sent for two minutes before messages commence.

The FBI evidence actually cites eight specific numbers messages sent to the Meyers' handler in 1996 and 1997. Despite one erroneous news story, it's clear that the US government monitors Cuban numbers.

As I recall, specific messages were also mentioned in the charges against some of the "Wasp Network" in 1998. Numbers broadcasts also figured in the trial of Ana Belen Montes, a senior US Defense Department analyst who was convicted of Cuban espionage in 2002.

What's especially interesting in these several cases is the repeated reference to the use of laptop computers to decode the messages. Presumably, the software would replace the one-time code pads that most experts assume are used for this purpose. While this would be fast and convenient, it seems to be a fairly insecure way for undercover agents to operate. However, Cuban intelligence communications are not always known for logic.

❖ Will Digital Replace Voice?

Computer decoding would also explain the sudden Cuban fascination with amateur digital modes. Since early experiments involved phase-shift keying (PSK), ENIGMA designated all Cuban digital transmissions as SK01. Cuba went through several other modes before settling, for now anyway, on one called RDFT (Redundant Digital File Transfer).

It seems fairly safe to assume that SK01 is an attempt to speed up the message transmission process, and maybe even to completely automate the decode. The "redundant" part of the mode is accomplished by repeating short bursts several times in a period that is typically around a half hour. Often, the whole thing is done over using other times and frequencies. This appears to be a way to get around RDFT's poor suitability for one-way broadcasting and its well-known inability to handle fading.

It is known from headers on some early experimental transmissions that Cuba is using a Windows program called DIGTRX. This apparently stands for "Digital Transfer." It's free ham software. Like most programs of this type, you certainly get what you pay for. Help is minimal and crashes are frequent. You want to be in the "Wxx" modes, which will automatically pick the right parameters when a transmission is detected.

Oddly, DIGTRX was originally intended for a totally misnamed mode that hams call "Digital Slow Scan TV." While this certainly is digital, it doesn't scan and it isn't TV. Furthermore, the hams have standardized on a different program. This leaves our friends in Havana as probably the world's primary DIGTRX users. I doubt we'll see this used as an endorsement any time soon.

Since RDFT is essentially a file-transfer protocol, the data can be anything. It's all ones and zeroes to the software. The Cuban stations started out with slightly reformatted versions of the voice and Morse messages in text files. With typical Cuban strangeness, they soon switched to what appear to be small binary files, but still mislabeled with the "txt" extension. Opening them in Notepad gives

Recent Cuban SK01 Frequencies		
kHz	Time UTC	Comments
5800.0	0630	
5883.0	0745	May repeat 5800
5898.0	0845	May repeat 5883
5930.0	0930	
5947.0	0900	
6786.0	0630	May repeat 6826
6826.0	0600	
8180.0	0800	
8180.0	0900	May repeat 0800
8186.0	0800	
8186.0	1000	
9063.0	0900	May repeat 8186
9240.0	1000	
10432.0	0900	
11435.0	0610	
11532.0	0630	May repeat 11435
12120.0	0500	
13380.0	0530	May repeat 12120
16178.0	1600	
17435.0	1700	Usually V02a

only unpredictable gibberish, because it is not straight text. It could be compressed text, or just about anything else.

Here's a short list of recently logged SK01 frequencies, in kilohertz (kHz). These are full-carrier amplitude modulation (AM), though decoding also works in upper sideband (USB) with appropriate retuning. Times are Coordinated Universal Time (UTC). DIGTRX is available at **www.tima.com/~djones/digtrx3.htm**

❖ Another Player – China!

A listener named "Ted" recently submitted a recording of an extremely strong USB transmission in Standard Chinese on 10185.0 kHz. This was apparently received about a block away from the Chinese embassy in Cambodia. It consists of the final two minutes of a numbers transmission.

Right away, it's easy to tell that the machine-generated female voice is a numbers broadcast. Even non-speakers can pick out "lio" (six) and "ling" (zero). Each 4-figure group is repeated.
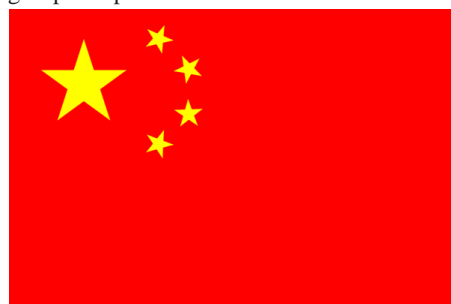
*Flag of the Chinese People's Republic (Mainland China)*

The channel is really noisy and the recording is over-modulated. There's major interference from two digital stations. Even so, the huge signal blows all this grunge away on voice peaks. While it's impossible to tell if it's really coming from the Chinese embassy, this seems like a pretty safe bet.

In order to spare everyone else's ears the torture, I put mine through analyzing this recording, I have done a considerable amount of digital processing to clean it up. The results aren't great, but they are an improvement. I've submitted the processed version to *MT* along with this column, and you can find the audio file on the *MT* website in the readers' area.

❖ V22?

The closest thing to this recording in the ENIGMA list is V22, most likely from the Chinese People's Republic military intelligence in Beijing. The format matches perfectly. At the end, the woman signs off with a full sentence. Asian numbers in general tend to be rather chatty. This has been translated as a "thanks" for listening.

V22 is rare outside Asia and Australia, though it's been reported in Europe and the US. It's even more rare to hear actual numbers. Most broadcasts are a null-message version with a 5-minute callup alone. This repeats "All stations in the country," and "This is Beijing."
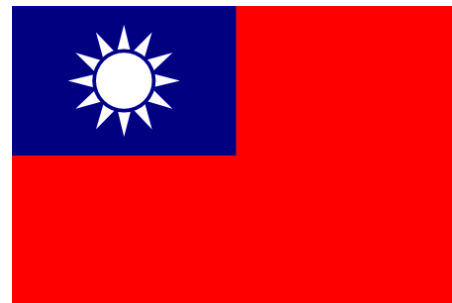
Flag of the Republic of China (Taiwan)

A good recording of this callup by an Australian listener named Matt is at **www.youtube.com/watch?v=jKMmgTDvgx4** . His is on 8375 kHz AM, which is by far their most widely heard frequency. Other known frequencies are 4760, 6355, 6465, 10200, 10520, 15640, and 16520 kHz, all AM.

Cambodian relays of Chinese numbers have been heard before, but the only ones I can find specific reports for came from a different station. That one is V16, with a much different format. It also comes from mainland China.

❖ Other Chinese Numbers

Mainland China is also one source of those mysterious CW (continuous wave) Morse transmissions that are audible all over HF at night. These are designated M89. They usually begin with one or more "V" characters (testing) and then a 4-figure alphanumeric callsign being called by another one. On rare occasion, there is also a message in 4-figure groups of "cut" numbers.

Similar CW traffic comes from Russia. Their stations are more likely to actually exchange messages, which are also in code groups.

The Republic of China (ROC Taiwan) gets into the act with its bizarre "Star Star Radio Station," in a Taiwanese dialect of Mandarin. You'll also see this translated, less accurately, as "New Star Broadcasting." Either way, it's V13.

Back when there were sunspots, V13 was a sure catch on the US West Coast in early morning hours. It has four different programs, which sometimes run simultaneously on different frequencies. Hourly repetitions last a good portion of the day. The station at least used to keep the carrier up between transmissions for tuning.

All of these broadcasts begin just before the hour with Chinese flute music, followed by a live female with a happy voice that has melted hearts worldwide. She wishes all her spooks a good morning, and does a callup. After more music, she goes into the messages, if any. She ends, after yet more music, with a cheerful sign-off that wishes us health and happiness.

Those lucky folks with a working ionosphere can listen for this one on 8300, 9725, 10182, 11430, 13750, and 15388 kHz, all AM. Recordings of this memorable station are available on the Internet.

Back with a bigger *Utility Logs* next month.

U TILITY WORLD

UTILITY LOGS   *Hugh Stegman*

ABBREVIATIONS USED IN THIS COLUMN

AFB ....Air Force Base
ALE ....Automatic Link Establishment
AM.....................Amplitude Modulation
AWACS ....Airborne Warning And Control System
CAMSLANT ....Communications Area Master Station, Atlantic
CW ....On-off keyed "Continuous Wave" Morse telegraphy
DEA ....US Drug Enforcement Administration
E10....................Israeli female phonetic letters, call and message
EAM...................Emergency Action Message
FAX ....Radiofacsimile
HFDL ....High-Frequency Data Link
HF-GCS ....High-Frequency Global Communication System
LDOC ....Long Distance Operational Control
LSB ....Lower Sideband
MARS ....US Military Affiliate Radio System
MFA ....Ministry of Foreign Affairs
MFSK-16 ....Multiple Frequency Shift Keying, 16 tones
NASA..................US National Aeronautics and Space Administration
PACTOR-1 ....Packet Teleprinting Over Radio, mode 1
PR.......................Puerto Rico
RTTY ....Radio Teletype
Selcal ....Selective Calling
SITOR-A/B ....Simplex Telex Over Radio, mode A or B
UK ....United Kingdom
Unid ....Unidentified
US ....United States
USAF..................US Air Force
USCG ....US Coast Guard
V02a..................Cuban Atención, callup + 3 5-figure-group messages

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

4440.0   MOE-Unknown net, possibly training, ALE with LARRY, CURLY, STOOGES, and NAS, also using 4927.5, 4775, 4820, 4828, 4893, 4927.5, 5773, 5804, 6885, and 7451; at 2018, (Jack Metcalfe-KY)

4537.5   ZHOH-German Customs vessel *ZB Hohwacht*, calling NDSWPOL (Water Police, Oldenburg), ALE at 0500. (ALF-Germany)

5732.0   OPB-DEA, Bahamas, raised J39 in ALE, then voice with Juliet 39, at 0524. (PPA-Netherlands)

5862.0   "P"-Russian Navy, Kaliningrad, RTTY message in 5-figure groups, then back to single-letter beacon, at 0539. (PPA-Netherlands)

5998.0   N838SC-Bombardier BD-700-1A10 bizjet, position for Santa Maria after answering selcal FK-GR, at 0120. (ALF-Germany)

6840.0   EZI-Israeli Intelligence (E10), mixing at the beginning with YHF2, AM at 1934. (Mike-West Sussex, UK)

7527.0   AFA2DA-USAF MARS, NJ, MFSK-16 net with five others, at 0028. LNT-USCG, VA, raised J29 in ALE, then voice as CAMSLANT Chesapeake with HH-60J Juliet 29, at 0053. (MDMonitor-MD)

7530.0   CAMSLANT Chesapeake-USCG, weekly test of new District Communications Net, checking in stations at 1300. (MDMonitor-MD)

7566.0   RCV-Russian Navy, Sevastopol, Ukraine, CW message in Russian, at 0406. (PPA-Netherlands)

7965.0   RJD85-Russian Navy vessel working RMRV in CW, went to 6324 for secure voice, at 0507. (ALF-Germany)

8000.0   WARTOC-US Army, net with ATKTOC, LBOTOC, and SHDTOC, also on 8974 and 9230, ALE at 2120. (ALF-Germany)

8042.0   COS-Chilean Navy, calling CAS in ALE, at 2057. (ALF-Germany)

8136.0   RDL-Russian military, 5-figure group message in frequency-shifted Morse, at 1535. (ALF-Germany)

8185.0   FGD9347-French sailing vessel *Sierra Echo*, calling HPPM1 (Sail-Mail, Panama), PACTOR-1 at 0425. (ALF-Germany)

8292.5   Unid-Algerian net control, calling roll of BOSTAN4 through BOSTAN10, PACTOR-1 at 0433. (ALF-Germany)

8337.6   RDC-USCG Cutter *Campbell*, ALE sounding at 1415. (MDMonitor-MD)

8340.0   123-Venezuelan Navy, calling T5L1 (Commander, Frigate Squadron), LSB ALE at 0145. (MDMonitor-MD)

8345.0   RIS96-Russian Navy vessel, working RIT (Northern Sea Fleet,

Severomorsk), and RIW (Moscow headquarters), CW at 2250. (ALF-Germany)

8381.0   SAFX-Unknown Swedish registry vessel, selcalling XVSV (WLO, AL) in SITOR-A, listening on 8421, at 0250. (ALF-Germany)

8885.0   "15"-HFDL ground station, Al-Muharraq, Bahrain, uplink to VP-BDK (A320, Aeroflot 205), at 1958. (PPA-Netherlands)

8912.0   A65-US Customs UH-60, ALE sounding at 0131. AAA-Israeli Air Force net control, ALE sounding at 2140. (ALF-Germany)

8918.0   New York, selcalling LR-DK, working Boeing 767 freighter N743AX, ABX Air flight 445, at 0054. (ALF-Germany)

8923.0   4XZ-Israeli Navy, Haifa, CW traffic and callsign at 2310. (MDMonitor-MD)

8930.0   Stockholm Radio-LDOC, working US Airways Cactus 768, at 2356. (MDMonitor-MD)

8933.0   New York-LDOC, working Cactus 725 (USAir) at 2225. (MDMonitor-MD)

8971.0   Trident 22-US Navy P-3C, clear and secure target tracking with Trident 21, at 1858. (MDMonitor-MD)

8983.0   CAMSLANT, positions from C-130s Coast Guard 1725 and CG 1719, at 2003. (MDMonitor-MD)

8992.0   Andrews-USAF HF-GCS, MD, radio check with US Navy LL 69, a P-3C, at 1219. Offutt-USAF HF-GCS, NE, patching Warlord 21 to Witch Doctor 16, possible US Navy, at 1752. (MDMonitor-MD)

9031.0   TASCOMM-UK Terrestrial Air-Sea Communications, radio checks with Royal Air Force C-130 Ascot 5583, at 0037. (MDMonitor-MD)

9047.0   AVS-US Civil Air Patrol "Avenging Spirit," a special national tactical callsign, ALE sound at 0100. (MDMonitor-MD)

9145.0   RIW-Russian Navy headquarters, Moscow, calling RIS96 in CW, at 1944. (PPA-Netherlands)

9253.7   NPFAMP-Brazilian Navy River Patrol Boat *Amapa*, identified in CW, then later went to 9253 voice to call Manaus and River Hospital Boat *Doutor Montenegro*, at 0007. (ALF-Germany)

10024.7 Unid-Egyptian MFA, Cairo, selcalling OOVF, Pyongyang, North Korea, SITOR-A at 2108. (PPA-Netherlands)

10081.0 "01"-HFDL ground station, Dixon/San Francisco, CA, squitters at 0536. (PPA-Netherlands)

10168.7 Unid-Egyptian embassy, Kinshasa, Congo, Arabic SITOR-A message for Cairo MFA, at 2101. (PPA-Netherlands)

10201.0 TAC-Chilean Navy, link check with PPZ, also on 6848, ALE at 0222. (ALF-Germany)

10242.0 OPB-DEA, Bahamas, ALE calling J08 (USCG MH-60J), then voice as Panther calling 08 Charlie, at 2110. (PPA-Netherlands)

10780.0 Cape Radio-USAF, Cape Canaveral Air Force Station, FL, calling NASA Booster Recovery Vessel *Freedom Star*, no joy at 1354. (MDMonitor-MD)

11175.0 Andrews-USAF HF-GCS, 125-character EAM at 0230. Tenement-US military, EAM and "standing by for traffic," at 0235. (Jeff Haverlah-TX) Dawg 22-GA Air National Guard, patch via Andrews HF-GCS to Halifax, NS, at 0235 (Allan Stern-FL). Japan Navy 85, patch to Japan via Elmendorf HF-GCS, AK, at 2345 (Richard Dillman-CA).

11220.0 Puerto Rico-USAF, Salinas, clear and secure with Golf Club, at 0306. (Haverlah-TX)

11232.0 Trenton Military-Canadian Forces, patching Darkstar Papa (E-3B AWACS back end) to Brimstone, at 1533. (MDMonitor-MD)

11354.0 "09"-HFDL ground station, Barrow, AK, weak squitters at 0631. (PPA-Netherlands)

12226.7 71-Egyptian MFA, Cairo, hexadecimal code in 5-character groups for Dakar, Senegal, SITOR-A at 1821. (PPA-Netherlands)

13568.0 N010HN-NH National Guard, calling HQ703N (US National Guard Readiness Center, VA), ALE at 1415.

13927.0 AFA5QW-USAF MARS, IN, patching C-130 Shark 35 to Coronet Oak Ops, PR, plane maintenance status is Alpha-3 for bad pressure gauge, at 1539. (Stern-FL)

15016.0 Club Dues-US military, 32-character EAM simulcast on 8992 and 11175, then "standing by for traffic," at 1830. (Haverlah-TX)

16061.7 Unid-Egyptian MFA, Cairo, SITOR-B in Arabic to Nairobi, Kenya, at 0935. (PPA-Netherlands)

17435.0 Cuban Spanish female voice numbers (V02a), AM callup 76111 41081 65422, at 1701. (Cam Castillo-Panama)

17967.0 Bahrain HFDL, uplink to 9V-SKD (A380, Singapore Airlines flight 333), at 1231. (PPA-Netherlands)

20890.0 J12-USCG MH-60J, raised LNT in ALE, then voice with CAMSLANT as Coast Guard 6012, at 1455. (MDMonitor-MD)

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Digital Utility Mysteries Solved

It's always satisfying to solve some digital listening puzzles, and sometimes that requires doing things the old-fashioned way. That means driving to your suspected transmitting facility with a shortwave receiver in hand, removing the antenna, and checking a few frequencies.

❖ The M42 Network Revealed

I was very pleased to see that reader Hector Vasquez wrote in after reading the July issue and our coverage of the interesting "M42" ALE network. If you recall, the network was so named after the ALE identifier of the most often heard protagonists, and we had speculated that the origin was the Mexican Police. Here is Hector's email:

I read your article about the "M42" Network in the July MT issue. I am a utility DXer in Los Angeles. Have posted several pirate logs in the FRN and listen mostly to HF aeronautical. Your article caught my attention as I have also monitored this network from my QTH in Los Angeles. Here is what I know.

This network of transmission on 7790kHz USB and LSB along with the other frequencies listed are used by the "Angeles Verdes" (Green Angels). This group is the equivalent of the US AAA. They work in conjunction with the Policia Federal (Mexican Highway Patrol). The Green Angels ride along all of the major Mexican toll road highways helping stranded motorists and also helping out during an accident.

From my location I have monitored most of the northern Baja units. The mobile units are green Ford F-150 pickup trucks loaded with gear (tools, gas, etc.). They use modified ham gear for the HF gear and they also have a VHF radio. The HF antenna that they use are no other than Hustler 40 meter resonators with an antenna tuner. The antennas are tilted to provide NVIS type of propagation.

The base stations are located at the border entry on the Mexican side. You can tell the base very easily from the fan dipole on top of the roof. Next time I go south of the border I will take a picture and send it to you.

Thanks to Hector for putting this one to rest!

❖ HF Transmissions from Cutler, Maine

Readers of our January 2009 and November 2008 columns will remember that we attempted to piece together the locations of a number of encrypted NATO RTTY transmissions from the very useful direction-finding data provided in the files of the ITU Monitoring Service (see Resources).

In researching the original piece, a number of monitors had insisted that the most northerly bearing was not likely to be the US Naval Radio Station at Cutler, Maine, since this was closed down a few years ago. Also, a number of intercepts of the 50bd/850 variety, listed as being US Navy, had been challenged, as only the French Navy were known to use this mode.

I continued to be skeptical about either claim, given the relative strength and propagation of a number of channels as compared to others – in particular, the consistently weak, groundwave-like signals with backscatter on the 50bd/850 16122.3kHz and 11687.5kHz signals, and the 75bd/850 15959kHz outlet.

We experienced an unseasonably poor start to the summer in Maine, with June breaking records for lack of sun and amounts of rain. It was in this weather we found ourselves on a camping trip to Acadia National Park, about 2 hours south of Cutler by road. I'm lucky to have an understanding wife and daughter, so after exhausting the local attractions in the fog and rain, I convinced them to take the ride to Cutler with me.

I took along my trusty Grundig Yacht Boy 400 radio, an aging synthesized portable about the size of paperback book. This radio is excellent for these kinds of tasks with a long foldable antenna, a jack for a longwire, 1kHz step tuning and (unusual for its time) selectable SSB. The radio has accompanied me on similar visits to the UK Sovereign Bases on Cyprus, and other places supposedly the origin of the infamous "Lincolnshire Poacher" numbers station. (As a side note, certainly at the time I was there, I could say categorically that the Poacher did **not** originate at these facilities.)

After collaborating with me on the January 2009 article, listener RU had tipped me off to the likely location of the suspected HF facility at Cutler. This large site can be found a few miles north of the famous VLF station's massive site which takes up most of the peninsula on which Cutler resides. The center of the antenna field is at 44.700630N, 67.278643W, an aerial view of which you can see below.
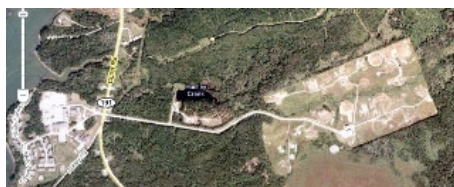
After the long drive, we arrived at the site just before the fog closed in, around 5pm. The old protective gates were down, so we proceeded down a small track; however, we were quickly greeted with a smaller keypad controlled barrier and accompanying CCTV camera. I suppose I could have run up the road to take photos of the complex, but having already provided the CCTV with my license plate, I wasn't in the mood to meet an unfriendly military policeman!

Listening to the Grundig with the antenna folded down, I was quickly able to verify that the following outlets all originate from this facility:

6726.0	75bd/850
11687.5	50bd/850
15959.0	75bd/850
16122.3	50bd/850

Unfortunately, with still a few hours to dark, there was no sign of the three other candidates from this site on 5345, 3127 and 3133 kHz, but in the light of this discovery, I'm still quite confident that these are night time frequencies operated from Cutler.

However, these results clearly scotch the myth that the US Navy no longer operates from Cutler on HF and that they aren't the source of 50bd/850Hz encrypted signals!

From a small hill about a mile from the site we were able, with the use of binoculars, to spy the antennas – a couple of monopoles and a perhaps as many as four very distinctive Andrews Granger "Spira-Cone" Series 3005 antennas. One tower carries microwave antennas, suggesting that the facility is now remotely controlled, as the old control buildings looked quite derelict.

Series 3005 Low Profile
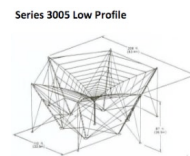
❖ You Can Help Too!

There are a few more locations that can be definitively tied to more US Navy RTTY transmissions, most of which were outlined in the original article: Saddlebunch Key in Florida, Dixon in California, and Apra on Hawaii. The ITU files also regularly point to unknown sites in the Great Smoky Mountains and Arizona. Perhaps you live close by and can do us a favor buy confirming what HF signals come from which site?

Until next time, make the most of the (hopefully improving!) solar conditions and catch some digital DX.

Resources
ITU Monitoring Service - **www.itu.int/ITU-R/terrestrial/monitoring/index.html**

More Small Countries, Booming Voices

In the June 2008 edition of *Programming Spotlight*, we featured three "Small Countries, Booming Voices" – the Czech Republic, Sweden and New Zealand. This month we once again look at a few more broadcasters who do a good job with limited resources, including Croatia, Thailand, the Vatican, and Vietnam.

Each of these countries has a fairly well heard external service with interesting and entertaining programs. In some cases, it's a chance to hear "exotic" languages and some remarkable sounding local music.

❖ Croatia

Croatia was one of the first nations of the Former Yugoslavia to begin broadcasting on shortwave, after the country began to break up. In fact, radio in Croatia has a long history, with the first station, Radio Zagreb, going on the air in March 1926. The early 1990s were a time of war and conflict as Yugoslavia splintered into a number of ethnically based nations. Sadly, it was also at this time that the term "ethnic cleansing" first came to the fore.

It was disturbing, yet interesting to listen to the give and take between Zagreb and Belgrade via the shortwave bands. Croatian Radio, Zagreb, gave their side of things and the then Radio Yugoslavia essentially spoke for Serbian interests (in fact at the time, in my ODXA column I often referred to Yugoslavia as "Yugoserbia").

All in all, Zagreb won the propaganda war, or at least fared better. In the early 1990s, Croatian Radio, Zagreb, was joined by a "clandestine" broadcast out of the United States (via WHRI) called Radio Free Croatia. It was perhaps evidence of the large Croatian diaspora living abroad. External broadcasts from Croatia are essentially intended for this diaspora.

The Croatian Radio website is a bit challenging to navigate – unless you speak Croatian. Virtually all English language content has disappeared (or is so cleverly hidden I couldn't find it. In my first *Programming Spotlight* in September 2006, I referenced the English pages of the website, but they are now history).

One can listen to a number of Croatian Radio streams/networks via the website. First you have to navigate to the audio page and scroll down to Glas Hrvatska (Voice of Croatia) **www.hrt.hr/index. php?id=hrt-uzivo**

Most North American evenings, the Voice of Croatia signal booms in on 9925 kHz. You will hear a wide variety of music via the Glas Hrvatska. I could listen for hours. You will hear Croatian songs of all varieties, Europop, and American tunes. In less than an hour I heard some funky blues, a smooth jazz number reminiscent of Chuck Mangione, and (um-m) a pretty bad cover of the Rolling Stones in Croatian called *Honky Tonk Woman* or in this case, *Honky Tonk Zhena*.

I can't follow all the Croatian dialogue; however, having taken a few courses in Slavic languages at University (Russian, Slovak) I can usually follow what they are talking about, or at least guess. Between the similar Slavic words and the odd English words that slip in, some comprehension is possible. But even if you don't speak the language, the music alone is enough of an attraction!

❖ Thailand

Thailand has an international voice, thanks to the installation of a number of Voice of America transmitters in that country. One can hear a daily half-hour program in English from Radio Thailand. I personally find reception spotty in our local summer, but much better in our local fall-winter season.

Thailand is an interesting country. It's the only South East Asian nation never colonized by Europeans. It's a democracy (more or less: its history is littered with coups d'etat) and pro-Western in its outlook. It's also a popular tourist destination, an industry which took a hit after the devastating tsunami a few years ago, which destroyed the popular resort town of Phuket.

The daily broadcast is not terribly remarkable – basically a half hour news program. Still, it's nice to hear news from another Asian nation and viewpoint. Try 15275 kHz at 0000 and 0200 UTC.

The other thing I like about Radio Thailand is that it gives one the rare chance to hear broadcasts in the Khmer language of Cambodia. Again, these always seem to come in best in the fall-winter period. Try 1115 UTC on around 7255 or 7260 kHz.

❖ Vatican City

The Vatican is one of the tiniest sovereign countries in Europe and yet at the same time, the home of the Pope and the administrative center of the Roman Catholic Church worldwide. It also boasts a powerful broadcast arm in its international voice, Radio Vaticana.

"By virtue of its Statute, Vatican Radio is the broadcasting station of the Holy See, legally based in the Vatican City State. It is a mean (sic) of communication and evangelization created to serve the Pope's Ministry. It was established by Guglielmo Marconi and inaugurated by Pius XI (Radio message Qui arcano Dei) on February 12th 1931.

"The main task of Vatican Radio is to proclaim the Christian message freely, faithfully and efficiently and keeping the centre of Catholicism in contact with the different countries of the world..." (Vatican Radio website)

Vatican Radio is not just another Christian broadcaster. There is on occasion a remarkable variety of programming. A recent broadcast included a Papal appeal for reconciliation in Honduras, "Remembering Srebrenica," as the European Union marks the anniversary of the massacre there during the Yugoslav conflict (see above), and, of all things, a movie review. Who knew the Vatican had a film critic?! In this program, he reviewed the film about John Dillinger called *Public Enemy*. Go figure.

Vatican Radio also has a sense of humor. On July 10, a segment called *Latin Lover* was aired. No, the Vatican hasn't loosened things up. *Latin Lover* is an occasional segment featuring Father Reginald Foster (who speaks with a North American accent). He is a Latin lover ... a lover of the Latin language, and he provides a commentary on some aspect of the language. In this case, in honor of the Feast of St. Benedict, they played an

archival episode in which he spoke about Pope Benedict's first Latin speech as Pope and about his fluency in the language (which he apparently speaks with a thick, "chunky" German accent). Interesting and amusing stuff indeed.

Of course, whenever a major event occurs involving the Church or the Pope, Vatican Radio is "must" listening. I became an SWL in 1978. Just a few weeks later came the election and brief pontificate of John Paul I, and subsequent to that, the amazing pontificate of John Paul II. Over the past three decades it has been interesting to follow the activities and events of this remarkable era via Vatican Radio (and, no, I am not Catholic). John Paul's many trips, including a few memorable trips to his homeland in Poland, and his trip to Cuba a few years ago were riveting and extensively covered by Vatican Radio. And, of course, the assassination attempt in 1981 and the coverage of his death in 2005 were very moving as well.

Vatican Radio is a unique broadcasting enterprise well worth a listen any time. It can be heard on shortwave to North America on 6040 kHz and 7305 kHz at 0250 UTC. DRM broadcasts to North America are at 1945 UTC on 9800 kHz and at 2300 UTC on 9755 kHz. You can also hear a wide variety of archived audio via the Vatican Radio website at **www.radiovaticana.org/en1/indicehq.asp?RedaSel=43&CategSel=20** (or just surf to the Vatican Radio website and click "High Quality Audio."

Finally, the World Radio Network offers daily Vatican broadcasts in a number of languages for listening or download at **www.wrn.org/listeners/stations/station.php?StationID=31**

As it says on the Vatican Radio website, "As it was in 1931, …Vatican Radio broadcasts the voice of the Successor of Peter to the City and to the World. We invite you to Listen for Heaven's Sake!"

❖ Vietnam

For many years, the Voice of Vietnam in Hanoi was pretty much a DX target. I was too young to be a listener during the long Vietnam War; it must have been a fascinating time to be a listener. As a youngster during the height of the war, I grew up on daily television news reports about this far away land. It seemed every night, we would hear

about places called Saigon, Hue, Da Nang and Hanoi. And something called the DMZ, which I later learned was the "demilitarized zone." And it seemed every night Walter Cronkite showed a bunch of pictures of the latest servicemen killed in the conflict.

In the 1990s, Voice of Vietnam ceased to be a DX target any more, when Radio Canada International began relaying them. Finally one could hear broadcasts from Hanoi with excellent quality.

Broadcasts from Canada alternate between a half hour of English and a half hour of Vietnamese. The latter broadcasts give one the rare opportunity to hear this unique and musical language. The VoV is also a window onto the culture of Vietnam, with a large proportion of the broadcasts devoted to music (traditional and pop) and culture.

The Voice of Vietnam has an ambitious web page. Unfortunately, many of the links do not work. Hopefully at some future point they will. It looks like they intend to offer a number of audio features, including Vietnamese lessons, historical audio, and music, among other things.

What audio they do have seems to be all in Vietnamese, although it's labeled in English. I listened briefly to one audio file, which seemed to be about the defeat of the French at Dien Bien Phu in 1954. It sounded very dramatic, featuring audio of air raid sirens and other sounds of conflict.

In the meantime, you can listen to the Voice of Vietnam daily on 6175 kHz at 0100, 0230 and 0330 UTC.

❖ Next of ~~Kim~~ Kin

As this column is written, news reports suggest that North Korean leader Kim Jong-Il is in poor health and may even be dying, reportedly having suffered a stroke and being subsequently diagnosed with pancreatic cancer.

These reports also suggest that he has designated his third son, Kim Jong-Un, as his successor, perhaps setting up the world's first communist hereditary monarchy. Kim would be the third generation of the Kim Dynasty, succeeding his father, and grandfather (Kim Il-Sung), who ruled the North for four decades.

I have never seen a program schedule for Radio Pyongyang/Voice of Korea. Perhaps it's a state secret. Occasionally their broadcasts are audible here in Southern Ontario. On the occasions I have heard it, the Voice of Korea is a throwback to the kind of programming one might have heard in the 1950s from any east bloc country, or from

Radio Tirana during the Enver Hoxha regime. Programming consists of glowing reports about the North and updates on how the war-mongering imperialists are once again threatening the peace on the Korean peninsula. There is lots of folk music, no doubt extolling the virtues of the regime and its leader, too.

And there is a heaping helping of The Juche Idea, "the official state ideology of North Korea. It teaches that 'man is the master of everything and decides everything,' and that the Korean people are the masters of Korea's revolution, which is based upon 'good times and laughter.'

Juche is a component of Kimilsungism, North Korea's political system. The word literally means 'main body' or 'subject'; it has also been translated in North Korean sources as 'independent stand' and the 'spirit of self-reliance'. (Wikipedia)

It might be worth monitoring the broadcasts from this reclusive country in the coming months, if indeed the news reports are accurate.

The younger Kim is reportedly western educated, speaks several languages, favors the music of Michael Jackson, and Jean-Claude Van Damme films. Then again, similar stories circulated about Yuri Andropov and Kim Jong-Il before they ascended to the top positions in their respective countries.

If you have no luck hearing the VoK, someone has posted a one-hour clip of a typical VoK broadcast (dated 2006) at one of my favorite websites, archive.org. You can access it at **www.archive.org/details/Voice_Of_Korea_6_26_06**

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Sino-Swearing On Shortwave

Kraig Krist was listening to R. Taiwan International, and glad his children were not, via WYFR 5950, June 12 at 0200-0259 when the *Taiwan Indie* program produced "many shocking curse words including the F-word, which have no place on an international radio station representing a country."

Keith Perron replies in *DX LISTENING DIGEST*: David Frazier, the producer/presenter let the F-word and S-word air on the program. I was notified that *Taiwan Indie* has been canceled and that David Frazier has been let go. This letter was sent to listeners who wrote RTI about it:

"We would like to offer our sincerest apologies for the program containing inappropriate language, *Taiwan Indie* which aired on Friday, June 12th. This is not representative of Radio Taiwan International, nor the Republic of China, and indeed we have a strict code which bans this type of language and content. We are aware of the severity of this type of mistake, and have moved swiftly to deal with the problem. RTI has cancelled the offending program and terminated the contract of the program host. In addition, we have conducted an internal review of our programming policy in order to ensure that this does not happen again. Sincerely, Paula [Chao]"

Kraig replies: Wasn't my intention to get anyone fired or have the show canceled. Quite an overreaction by RTI. A simple "use discretion – never know who is listening or the age(s) of the audience" talk with the host would have been sufficient.

Keith answers: RTI is trying to get more money, and any type of bad PR could work against them. The propaganda machine in China could also use this to slam RTI.

Kraig Krist adds: Listen to the Voice of Turkey for some surprisingly frank talk on concubines.

And says Sergei S., Chicago or Moscow: I'm still waiting for words of apology from Radio Jeddah, Sa'udi Arabia. Don't get me wrong; its spoken English broadcasts on 15250 are very pious. But an "F" word is heard loud and clear in many of the pop-songs it carries in between the features. Besides, I don't get it why the station broadcasts Britney Spears's "Oops, I did it again" right after the uplifting talk on the Righteous Women of Islam. Could that be a secret message from the Saudi dissidents?

ANTARCTICA LRA36, Radio Nacional Arcángel San Gabriel, Base Esperanza, usually reliable on 15476, not heard for a week so I e-mailed them. Reply said from June 21 they were having a cold wave, wind chill down to -60 degrees, and winds up to 207 km/h, which kept them off the air (Manuel Méndez, Spain, *WORLD OF RADIO*) And not reported during the following month (gh)

BIAFRA [non] V. of Biafra International, Fridays 1900-2000 via WHRI had been on 17520 reliably since April, but July 10 it was missing, soon found at 1930 on 15665 instead, a previously used/scheduled channel, in Ibo at the moment with English words mixed in such as "self-determination," apparently a non-native concept to the Biafrans. 1933 back into full English exhortations. Had their website 🔊 **www.biafraland.com/vobi.htm** been updated to reflect this? Of course not! Still showing long-abandoned 15280 and an hour later than reality. Audio archived does not mention any frequency (gh)

BRAZIL New station on 60m, 4885 is R. Maria, Brasília, heard in late June at 1250-1310 with Catholic preaching (George Cunha, DF, *Ondas Tropicais* group, via Marcelo Bedene, Paraná DX Club) Heard at 2311 but QRM from Pará with sports starts at 2320 (Jorge Freitas, Bahia, *ibid.*)

At first I thought it was R. Clube do Pará or R. Difusora Acreana, also on 4885, and phoned them. But also talked to an official of R. Maria who said it was in experimental phase. ANATEL gives all the details: Belongs to Fundação Nossa Senhora Aparecida and the 1 kW transmitter, ZYF-692 is located at Anápolis, Goiás at Latitude: 16º 15' 25" 00" S, Longitude: 49º 01' 08" 00" W with a 91.4 meter tower, schedule daily 07-24 UT (Bedene, *ibid.*)

Not exactly new, as *WRTH* 2009 has this * as inactive: GO12) F692 *4885 1 R. A Voz do Coração Imaculado, Anápolis, C.P. 354, 75001-970 Anápolis, **www.immacolata.com** LASWLOGS shows it last reported in August 2004. What marvelous frequency management by ANATEL, as if two Brazilians on 4885 were not already one too many (gh, *WORLD OF RADIO*)

This was originally R. Carajás, then Rádio Voz do Coração Imaculado, which became inactive; now the frequency is sold to R. Maria, using the same equipment (Adalberto Marques de Azevedo, *ibid.*) I wrote R. Maria and reply from Padre Reinaldo indicated the project had been going on for four years, just now on the air, and they were enthusiastic to hear from listeners (Marques, *radioescutas*) DXers publicizing this automatically become missionaries of Our Lady's project to save souls (Padre Reinaldo, via Marques, *ibid.*) Uh-oh (gh)

R. CBN Anhangüera, Goiânia, 4915, 6080 and 11830 changed its programming and name at end of June to Radio Daqui; not sure if all the frequencies are active (Jairo Barbosa, and Marcelo Bedene, DX Clube do Paraná yg) Relay of MW 1230; 4915 heard at 2301 (Marcelo Vilela Bedene, *ibid.*) Heard at 2147-2213; they still mention CBN, maybe on old recordings. At 2300-2315 heard the other 4915 station, R. Difº, Macapá AP, with interference (Carlos Gonçalves, Portugal, *DXLD*) *Daqui* just means "from here" (gh)

CANADA [and non] RCI/CRI relay exchange, questions and thoughts! The deal started way back when Allen Familiant was head of programming at RCI as a way to reach Asia/Pacific with a clearer signal. But who is really in charge of this agreement, RCI or CRI? Or is it on a level playing field? I know for a fact CRI is not paying cash for the exchange, even if they are using four times more hours than RCI.

1. RCI's website is blocked in China. You never hear RCI bring this issue forward. 2. RCI provides a clear signal into NAm for CRI, while their "partner" is jamming other stations. Does RCI bring this issue forward? 3. How can RCI, who say they stand for freedom and democracy of the media, then on the other hand provide a platform for China's propaganda machine? (Keith Perron, Taiwan, *DXLD*)

CHINA Firedrake musical jamming by China against Sound of Hope, Voice of Tibet, etc. continued to be widespread in June and July. Scanning for it almost every morning 1230-1530, no two days were identical in frequency usage and relative strengths, but these were most active: 8400, 9000, 13500, 13970, 14420/14430, 15150, 15600/15610, 15720/15730/15750, 17470/17500, 18320 (gh)

[non] R. Free Asia is always jammed, often by echoing CNR-1 program rather than Firedrake, so how can you be sure you are hearing RFA rather than jamming? Kim Elliott's wife Jinling gives us the RFA ID in Mandarin: *"Tse Yo Ya Zhou Dien Tai,"* literally "Free Asia Radio Station" (gh)

6043, Voice of Shangri-La. Site unknown. First heard 3 June with pleasant sounding Asian song at 1023 with muffled announcements, also 8 and 12 June; on 18 and 23 June, unknown Asian language until 1100, then an English ID "This is the Voice of Shangri-La," and into Chinese! (Dennis Allen, NSW, *Australian DX News*)

Surely PBS Yunnan, spur of 6035; but the *Shangri-La* bit is new. Can Ron Howard hear that English ID? (gh, *WORLD OF RADIO*) Not yet. 6035, PBS Yunnan, 1246-1303, June 12, Vietnamese switching to Chinese at 1300. Clearly parallel to both spurs (6027 and 6043). 6043 had better reception than the primary (Ron Howard, CA, *ibid.*)

COLOMBIA New QSL policy from July 1 for La Voz de tu Conciencia, 6010 and Marfil Estéreo, 5910: Reports must be sent via postal mail only to (name of station), c/o Rafael Rodriguez R., Apartado Aéreo No. 67751, Bogotá D.C.,

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; sesqui = one and a half; A-09=spring/summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

COLOMBIA. 2 IRCs appreciated but not required (Rodríguez and Martin Stendal, *Conexión Digital*)

COSTA RICA REE, SPAIN, will start digital broadcasts to NAm early next year via the Cariari relay (EFE via Yimber Gaviría, Colombia, *DXLD*) Presumably means DRM though not stated (gh) Antonio Buitrago of REE confirms it will be DRM (Gaviría, *ibid.*).

CUBA Besides ever-changing daily SNAFUs of bad modulation, open carriers, wrong languages, missing or unlisted frequencies, mixing products, RHC further departed from its published schedule as soon as Pres. Zelaya was ousted from Honduras June 28, much of it TV audio from Cubavisión or TeleSur. Spanish took over several scheduled foreign-language blocks on RHC, including English, and transmissions were expanded to 24-hour service in Spanish, mostly about Honduras.

The former siesta at 1500-2000 found at least six unscheduled frequencies on air: 13760, 11800, 11760, 11690, 6000, 5965. English after 0500 was cut back to only two frequencies, and Spanish was expanded past 0700, probably all-night until the next day's programming from 1100. Will this still be the case? Who knows, but once RHC gets an obsession, it's hard to relent. Just ask the *5 Heroes*. An entire column could be filled by our detailed monitoring about this, as published in *DX Listening Digest* (gh)

[non] Radio República, 9545 heard 0246-0340, June 14, for the first time with no jamming (Ron Howard, CA, *DXLD*) RR vs jamming level does vary a lot. They announce schedule as Mon-Sun 7 pm-midnight = 2300-0400 UT on 9545, and website **www.radiorepublica.org** Previously we knew only of the parent organization's **www.directorio.org** The RR site does have a program schedule for each day of the week in non-copyable format, plus a blog.

Radio Cuba Libre was normally totally inaudible via WRMI 9955, scheduled daily 1200-1400, buried under jamming from Cuba. July 3 at 1348 I found it atop the jamming and quite readable! WRMI must have switched earlier than usual 1400 to its NW antenna, good for us but not for the resident Cubans. RCL announcer was Mario Jiménez, from the studios of RMI.

WRMI website explained: "a program block for Cuba with segments from the various organizations that make up the Municipalities of Cuba in Exile." However, an updated WRMI program grid July 11 no longer showed RCL at all, but R. Prague filling much of its former airtime (gh)

Radio Cuba Libre just ran out of money, so it's off air till further notice. If the CIA were really financing us like Arnie says (he includes gh too), we wouldn't have those problems! I would love to be financed by the CIA.

Despite the lack of CIA money, our engineers were finally able to get the antenna switcher to operate as part of the automation system this week, so we no longer have to do this manually. Now everything should always be on time, program automation coordinated with antenna switches (Jeff White, WRMI, *DXLD*)

CZECH REPUBLIC [and non] Western North America in particular is a difficult region for transmissions from Central Europe, and Radio Prague was also renting a relay service from Sackville, Canada at 0330 on 6080. Unfortunately, this is terminated starting July 1 on account of a budget cut associated with the current global economy downturn.

Therefore I am very much interested in your report of good reception of 9870 that is indeed from Litomysl in the Czech Republic (Oldrich Cip, R. Prague, to Kevin Molander, CA, *WORLD OF RADIO*) Direct 9870 at 0300-0330 is at 324 degrees across Butte, mid-Nevada and Santa Bárbara, while // 7345 is aimed further east at 310.

As of July 11, WRMI, 9955, was filling airtime with multiple R. Prague relays in English and Spanish, but most of them bonuses subject to replacement by other programming:

0300-0430	Tue-Sat
0430-0500	daily
0600-0700	Mon-Sat
0700-0900	M-F
0900-1000	daily
1000-1100	M-F
1200-1430	daily (gh)

EGYPT R. Cairo on 6860 around 1700 July 9 in English instead of scheduled Turkish, // listed 12170. Audio was so terribly distorted that it was difficult to determine if an OM or YL were speaking. Also next day at 1754 in English on 6860 // 12170, distorted audio (Robert Foerster, Germany, *DXLD*)

FRANCE The strike at Radio France Internationale was suspended July 10 at a mass meeting of journalists, technical and other staff. Unions leading the action say they will relaunch industrial action in September in efforts to fight a management plan to axe 206 jobs; if a settlement is not reached before then. At nine weeks [since May 12] the strike was the longest in the history of broadcasting in France since the 1968 general strike. Strike leaders stressed that they have not accepted management's plan to axe over 200 jobs and describe the suspension as a "summer truce." They do not want to "penalise" free-lance journalists and workers on short-term contracts, who become more numerous in summer (RFI website)

RFI in South Slavic languages finally resumed at 1400 July 13. But then they were permanently canceled July 20 with only two days notice! (Dragan Lekic, Serbia, *DXLD*)

GREECE [and non] VOG, which was finally rid of collision by CVC Zambia on 9420 until 2200 earlier this year, was hit by another Christian broadcaster in July, as YFR started relays in English on 9420 via Ascension at 0000-0300, 265 degrees to S America. VOG was generally atop in NAm, but no longer a clear channel and likely to lose out to Ascension more and more as fall comes on (gh)

HONDURAS The ouster of Pres. Zelaya on June 28 provoked heavy coverage on expanded broadcasts from R. Habana Cuba [*q.v.*]. But SW was already out of the picture in Honduras, where the biggest signal, which isn't saying much, was missionary HRMI on 3340. It was not heard again until July 4 at 0622, but unlikely to involve itself in the controversy, and not ever a source of news of the present rather than the past and future (gh) Also July 5 at 0615-0630, Radio MI with music and English IDs, California address (Brian Alexander, PA, *DXLD*)

The only other sometimes active SW station is also missionary (gh) 3250, Radio Luz y Vida, 0349 Jul 7, religious talk in Spanish followed by music until signal gone at 0354* presumed sign-off (Rich D'Angelo, PA, NASWA *Flashsheet*)

INDONESIA In June and July, Ron Howard and I monitored the behavior of VOI almost every morning during the 13-14 UT English broadcast on 9525v. It's never exactly on frequency but 40-140 Hz low, sometimes near 9525, sometimes 9526. June 25-26 it was 9525- but with hum. June 30 and July 1, a big problem had developed, multiple carriers in the 9523-9528 area producing whining hets among them and preventing audibility – either one transmitter misbehaving or more than one operating by mistake. July 2 was OK with no hets, but shifted to 9526- with hum. July 3 the constant cacophony was back but in a different complex pattern.

Ron found a Japanese website with SDR displays for June 30 and July 3. On the first date, showed center frequency as 9524.9 with spikes at 9523.9 and 9525.9; on the second date, center frequency 9524.89 and spikes at plus and minus 600 and 1200 Hz. July 4 OK again through July 14, including the every-Tuesday *Exotic Indonesia* hookup with RRI Banjamarsin. July 16-17, no signals at all. July 18-19 resumed, back to 9525-. And so it goes (gh, OK)

JAPAN On 9595 // 6055, R. Nikkei-1, at 0830 with half hour Saturday program *Let's Read the Nikkei Weekly*; in English and Japanese presented by Noriko Tada, Gregory Clark and Jeffrey Swiggum; ads for Eiken language testing, "presented by the Society for Testing English Proficiency, Inc." See **www.radionikkei.jp/LR/** (Ron Howard, CA, *DXLD*)

LAOS 4412.59v, Lao National Radio via Sam Neua, 1156 June 26 playing SE Asian music and not // 6130. From 1200 // 6130 with usual gong/bell rung 7 times; anthem and into the news in Laotian from Vientiane. On July 8 heard on 4412.62v, at 1218-1231* with unusual programming, problem with feed from Vientiane? For the first time heard post-1200 not // 6130 with non-stop nice SE Asia music and songs; brief sign-off announcement followed by choral national anthem (*Pheng Xat Lao*) till off. 6130 had the usual news till 1230. July 10 at 1213 on 4412.59v, back to normal programming // 6130.

6130, LNR also heard 1416-1423, Monday June 29. After news, introduction in Laotian for *Functioning in Business*; mentions VOA, which produces this program in English, "Hello. I am Elizabeth Moore," about making and confirming reservations. Scheduled for Mon. and Tue., but often also noted on Fri. and Sat., at 1415-1430.

7145, LNR external service reactivated since June 26, heard several dates to mid-July in 1250-1402* period, sign-off time varying a few minutes. Cambodian and SE Asian music until French starting before 1300; English start varies 1326 to 1333, mentions FM 97.25 MHz and other English at 0600; local news until 1351 and sometimes a few minutes of Lao ads before sign-off (Ron Howard, CA, *DXLD*)

MALAYSIA Voice of Malaysia heard three dates in mid-June during the 1130-1230 Chinese service varying 11884.67 to 11884.70: pop music, strong signal, but very distorted audio, // 15295 until 1230*, 1229 English ID on 11884.70, but then other audio from RTM with no distortion until 1232 one day, 1237* another, mixing feeds at equal strength of both Asyik FM // 6049.60v and R. Malaysia Klasik Nasional // 5964.90v (Ron Howard, CA, *DXLD*)

I heard VOM on 11884.7 too in Chinese, distorted audio from 1148 music interrupted for talk, news? After 1200; 1229 brief announcement and 1230 open carrier. This hour is not jammed! Is it for overseas Chinese around SE Asia? No, target is Beijing area, with 50 or 100 kW at 25 degrees from Kajang site, and thus also favoring us. Perhaps the Chinese consider VOM too insignificant or sufficiently autocratic. Nice to hear VOM here, as I never have any luck with VOM on 15295, or any of the 7 MHz Malaysian channels (gh, OK) On a later date in July, 11884.49v at 1211-1222*, thanks to a tip from Dan Sheedy, not in usual Chinese, but seemed to be in Bahasa Indonesia. Audio quality improved, suddenly off in mid-song (Ron Howard, *ibid.*)

MÉXICO See last month; in June and July we had numerous reports from North America and a few from Europe of XEQM Mérida, apparently on the air 24 hours, varying slightly around 6104.7. From FL and TX it was audible in the daytime (gh)

MYANMAR Myanma Radio reorganized services from early July. 9730.8v used to sign off at 1512* but now heard until 1530* and now a very recent development, clearly // 5915, poor under CRI. No longer the Educational Service at this hour. Later, *Distance Learning* was found

ending with algebra at 1245. After 1300, 9730.8v played a wide variety of songs till sign-off. A few days later it was off the air but 5915 still on and not // 5985 or 5770 (Ron Howard, CA, *DXLD*)

NETHERLANDS Alfonso Montealegre is retiring from RN effective Sept 1, after many years with the station, best known for producing Radio Enlace with his partner Jaime Báguena; as heard on an interview from REE Spain (via Hugo López, *condiglist* yg via *@tividade DX*) Best wishes to our former colleague Alfonso, who this summer has been visiting four of his favorite stations in east Asia, RTI, KBS, NHK and CRI, and also heard interviewed on some of them (gh)

NIGERIA In early July I observed Voice of Nigeria broadcasts on 15120 only at 0600-0700 & 1700-1900 English, 0700-0800 French. These times are also announced at end of broadcasts, but no other English or French transmissions. Possibly on strike? (Thorsten Hallmann, Germany, **www.africalist.de.ms** *DXLD*) There was a strike, but maybe temporary curtailment as they are installing new equipment (gh):

An ultra-modern radio transmission station in Abuja was to be the first of its kind and the biggest in Sub-Sahara Africa, equipped with the most modern DRM equipment. At a total cost of roughly 40 million US dollars, the turnkey project is the largest single investment in shortwave transmission by any country in Africa.

The contract was awarded in 2006 to a consortium led by Thomson Broadcast & Multimedia; includes three 250 kW shortwave transmitters, two curtain antennas, a rotatable high performance curtain antenna. The project will reach a timely completion in 2009 (*Radio News*, Thomson Broadcast & Multimedia via Rachel Baughn)

POLAND The license fee for Polskie Radio and TVP will be replaced by direct state funding as of 2010. However, the original plan was to determine a minimum budget of about 900 megaZloty. This has been eliminated in the legislation process; instead the parliament will now decide on the budget every year. Thus Polskie Radio and TVP are in fear over their future and independence. Now the foreign service of Polskie Radio fears that they could be amongst the first things to be axed if PR runs out of money. Thus they sounded the alarm.

But Polskie Radio in German did not go out 1530-1600 on 5945 for at least two weeks; instead AWR Hindi had been put on air. This could happen because Issoudun transmits it at the same time on 15160. And nobody, besides a single listener, noticed. Not really promising (Kai Ludwig, Germany, *DXLD*)

ROMANIA [and non] RRI on new 7535 for Romanian to NAm at 0000-0200, from early July heard until 0157* bothering Cairo Spanish on 7540, which had better stay there now instead of jumping to 7535 as it did earlier. RRI 7535 is ex-7335, whence Vatican aims eastward but which has an additional occupant now, YFR in English at 0000-0300, 245 degrees from Ascension (gh)

SERBIA Acting director of Radio Yugoslavia (International Radio Serbia) Milena Jokic has resigned, due to the unresolved status of the organization. In a written explanation sent to Prime Minister Mirko Cvetkovic, Ms Jokic stated that the Ministry of Culture has not shown any readiness whatsoever to do anything about resolving the status of the organization. Ms Jokic expressed hope that the Serbian Government will keep in mind the significance of informing the world public and the Diaspora in 11 foreign languages and in Serbian, through the Internet, satellite and shortwaves.

But in mid-July IRS received a draft contract from the Ministry of Culture that French, German, Hungarian, Italian, Greek and Arab services should be disbanded, leaving English, Chinese, Russian, Albanian, Spanish and Serbian. Milena Jokic said that was not acceptable (*Media Network* blog)

SOLOMON ISLANDS 9541.5, SIBC Honiara absent 8 June but back at 0310 on 10 June with repeated 'Born Free' orchestral, and soccer commentary. Best on LSB to avoid Radio República 9545 with background 'waterfall' jammer, good signal strength but continuing modulation problems (Bryan Clark, New Zealand, *WORLD OF RADIO*) There followed numerous reports of it from NAm, especially around 0800, to as late as 1500 in California by Ron Howard (gh)

SIBC 5020 has been off the air for some time awaiting spare parts, hard to find; maybe back in a few months. 9542 on the air, but due to a problem with the oscillator, don't expect it to be on frequency 9545 any time soon (Adrian Sainsbury, RNZI *Mailbox* June 29)

9541.5, nothing heard in usual 0500-0900 window for several days through July 3 (Bruce Churchill, CA, *Cumbre DX*) No SW broadcasts at present. Transmitter on 9541 turned off to save electricity. Was not covering the Solomons, but heard elsewhere which was not its purpose (Gordon Brown, NZ, *NWDXC* July 7 via *BC-DX*) Had had no trace of 9541.5 for at least a week. Could it be that DX reports from overseas were counter-productive?? (gh)

SOMALILAND R. Hargeisa noted with sign-on at 1455 on 7145 (Rumen Pankov, Bulgaria, BDXC-UK *Communication*) So evening schedule is probably 1455-1900 UT; best here after 1800 (Dave Kenny, England, *ibid.*) If it is signing on as early as 1455, could be heard by long-path in western North America; look for it. That's close to 6 pm local in Somalia, so plenty of darkness eastward (gh)

SUDAN Radio Peace has returned to air after several months inactivity. We'd appreciate monitoring reports. Schedule is (all Christian programs):

4750 [*WRTH*: 1 kW]: M-F 0230-0415, 1600-1800 for Southern

Sudan and Southern Darfur regions, including English 0230-0250, 1600-1620; mixed with Arabic at 0310-0340 and 1730-1800.

5895 [*WRTH*: 4 kW]: M-F 0300-0400, 1500-1600 for Nuba Mountains and Northern Sudan, including English 0300-0315, 1500-1515; mixed with Arabic 0330-0400, 1520-1600 (Pete Stover, Manager, Radio Peace, July 1, via Patrick Robic, Austria, *WORLD OF RADIO*)

TAIWAN 9774, Fu Hsing Broadcasting Station (tentative), 1245-1300*. Thanks to a tip from Dan Sheedy (So. Calif.), I heard this station that is not often reported. Mostly talking in Chinese; played one EZL song in English; weak with adjacent QRM. Dan had positive 9774 // 9410. Schedule: 0400-0600, 0800-1000 and 1100-1300 (Ron Howard, CA, *DXLD*)

Aoki shows 9774, as 10 kW ND from Kuanyin in Chinese, daily also at 23-01 // 9410 and 15375. *WRTH* 2009 had this only on 5995 and 9410 as third program for the Mainland. Operated by Military Information Bureau, Ministry of National Defense. I'd think that would be plenty to get it jammed, but not *a*terisked* in Aoki listings (gh)

UKRAINE As usual, RUI plans to change most of its frequencies on an odd date, Sept 20, equinoctially-influenced as autumn comes on – except for English to NAm at 0000 & 0300 which stays on 7440. But the other English to Europe: 0000 & 0300 5830 ex-7530; 0500 on 7420 ex-9945; 0900 on 9950 ex-11550; 1900 on 5840 ex-7490; 2100 on 5840 ex-7510 (via *DX Mix News*, Bulgaria)

U S A George McClintock reports that the construction permit for his own SW station, Leap of Faith near Nashville, was granted June 30. Should take at least three months to get this "labor of love" on the air, but no big hurry. Much of the equipment is already on hand, and transmitter #1's time is already sold out. #2 to follow is expected to be 50% in Spanish, roughly 6 pm to 6 am local. Callsign has not been selected yet (*WORLD OF RADIO*)

FCC also granted a CP June 15 to George S Mock (d/b/a Hill Radio International), for a new international HFBC station in Milton, FL (via Benn Kobb, *DXLD*) To be known as WJHR as previously reported here (gh)

WMLK antenna repair project photos: **http://wmlkradio.net/ antenna_update_progress.htm** WMLK is off air on SW, so why are they registered at FCC, on 9265, 9955, 15265? And I was surprised to hear their audio streaming is working just fine (WMA, 20 kbps, 22 kHz, stereo):

🔊 **mms://stream.evenlink.com/wmlk** (Dragan Lekic, Serbia, *DXLD*)

Will be interesting to hear if and when the antenna is fixed, they manage to modulate more than 5 percent, as it was barely audible, Damascus-like, long before the storm damage. You don't have to be on the air to be registered with the FCC! Just ask KTMI, WRNO, et al. You are supposed to be paying spectrum usage fees, though the FCC is not too strict on collecting those either. FCC listings are even more imaginary in the case of 9955 and 15265, which WMLK have never really used; meanwhile, WRMI really has 9955 available 24/7 (gh)

WRMI: see CUBA [non]

[non] WYFR added more and more relays this summer, seemingly with limitless funding, maybe soon buying time on every available SW relay site in the world. But then, the world is ending on October 20, 2011, so need to use it up now, meanwhile driving away SW listeners!

Even Bonaire tested YFR for a couple of weeks though it won't broadcast RNW in English any more. It was unclear whether some of the others were permanent or tests, but Harold Camping droning also could be heard via Ascension and French Guiana on several 7, 9 and 11 MHz frequencies, as if a dozen transmitters in Florida were not enough, already. In case you missed it, Camping was just as certain the world would end in 1994. See also GREECE (gh)

VANUATU R. Vanuatu reactivated July 1 on exactly 3945.000, 0910 light ballads and island music, 0918 simple ID by man in English, "This is Radio Vanuatu" (David Sharp, NSW Australia, *WORLD OF RADIO*)

Also at 1030, good level in Bislama. Must be new 10 kW transmitter (John Durham, NZ, *HCDX*) 3945 heard July 3 with very nice S3 level from 0858 tune past 1000 news (Bruce Churchill, CA, *Cumbre DX*) Also July 5 at 0933-1002, weak-poor (Scott R. Barbour Jr., NH, *DXLD*)

Two new 10 kW SW transmitters are being installed. Plans to use 3945 at night and 5050 in the daytime; 7260 for daytime in the summer, likely not until November. New transmitters should last a long time if they are properly cared for, avoiding corrosion, etc. (Adrian Sainsbury, returning from Vanuatu to assist them, RNZI *Mailbox*) Long registered on 5050, but not heard yet. Watch out, WWRB. And beware of R. Nikkei, Japan, also on 3945: program 2 with 10 kW non-directional at 2300-0605 UT, extended to 0900 on weekends (gh)

VIETNAM [and non] 9550 with two weak Asian stations mixing, a fast SAH, maybe 10 Hz between them at 1327. One is in Chinese, the other in Vietnamese, but after 1330 only one of them remains. A radio war between Vietnam and China, Commies vs Commies? Aoki listings confirm the two are broadcasting to each other on the same frequency at the same time in reciprocal languages! CRI in Vietnamese at 1100-1700, 500 kW, 193 degrees from Beijing site; and VOV in Chinese at 1100-1330, 1500-1700, 100 kW, 27 degrees from Hanoi-Sontay site. Depending on relative skip distances, one may slide in under the other at certain locations, but in much of SE Asia, the collision is bound to be huge. And this is nothing new (gh, OK)

Until the next, best of DX and 73 de Glenn!

BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH
gaylevanhorn@monitoringtimes.com
http://mt-shortwave.blogspot.com

0026 UTC on 9745USB
BAHRAIN: Radio Bahrain (presumed). Arabic, *Call to Prayers* segment to program pause at 0030, recitations through 0050. Announcer duo between percussion and wind instrument bits. Signal lost by Radio France International's French Guiana relay on 9750 kHz, sign-on at 0059 (Scott Barbour, Intervale, NH).
🔊 Streaming FM audio www.radiobahrain.net

0300 UTC on 7110
ETHIOPIA: Radio Ethiopia. Chimes and gong signal at 0300 into Amharic talk. *Horn of Africa* style music during fair-good signal quality. Weak signal on // 9704.19. Very weak on // 5990.19. Monitored in Amharic on 7110, 2045-2101.* Station signs-off with national anthem at 2059. Signal weak but readable. Very weak on // 9704.19 (Brian Alexander, Mechanicsburg, PA). Audible 7165 (Arabic), 1420-1435 // 9559.90v (significant drifting) (Ron Howard, Asilomar Beach, CA).

0402 UTC on 4885
BRAZIL: Radio Clube do Para. Evening program of dance music and Portuguese announcement breaks (Joe Wood, Greenback, TN). Brazilians monitored in Portuguese: **Radio Inconfidencia** 6009.81, 0701-0720 (Alexander). **Radiodifusion Do Amazonas** (presumed) 4805, 0945-1000; **Radio Senado** 5990, 1010-1030; **Radio Inconfidencia** 6010, 1017-1030 (Chuck Bolland, Clewiston, FL). **Radio Aparecida** 6135.06, 0930-0945 // 9629.97 (Alexander).

0411 UTC on 5446.5USB
USA: American Forces Network/AFRTS (Key West, FL). Discussion on wolves and the endangered species list, to news of coal spill in Kingston, Tennessee. Several station IDs as both "NPR" and "AF Radio." Good on // 7811 (Key West) (Wood). AFN/AFRTS (Hawaii) 10320USB, 2058-2103+ // 12133 (Key West, FL). (Harold Frodge, Midland, MI/MARE)

0540 UTC on 9541.54
SOLOMON ISLANDS: SIBC. Conversation in English and presumed Pidgin. Local island music, covered by DRM at 0700. Signal too weak to pull out any program details. (Alexander) Additional SIBC monitoring; 9541.5, 0555 (presumed) weak signal and slow fading. No ID heard (Jim Evans, Germantown, TN) SIBC 9541.53, 1031. ID: "You are listening to the news broadcast from the Solomon Islands Broadcasting Corporation in Honiara." Signal heard up to 1135, but sounded like audio present at 1456 recheck (Dave Valko, PA/Cumbre DX). SIBC (presumed) 9541.50, 1450-1500. Typical BBC relay programming, just above noise level (Howard).

0655 UTC on 9580

GABON: Afrique Numéro Un. Back-to-back Afro pop music program. French ID: "Afrique Numéro Un," followed by ten minutes of news. Afro pops resumed, audible until signal began to fade. Signal poor throughout (Bruce Barker, Broomall, PA).
🔊 Streaming/on-demand audio: www.africa1.com

0900 UTC on 6140
UNITED KINGDOM: European Music Radio. Sign-on for weekend relay program. Station ID: "This is EMR, European Music Radio broadcasting on 6140 kilohertz shortwave." Tom Taylor's *Mailbox* program. Station address and email given as *studio@emr.org.uk* (Manuel Méndez, Lugo, Spain/Cumbre DX).

0956 UTC on 0955
PAPUA NEW GUINEA: (New Britain) Radio East New Britain. Pop music tunes to program promo with mentions of "NBC" into Bee Gees song. Pidgin announcement at 1000UTC including date and NBC native music signature. ID and intro into English newscast (Valko). Additional PNGs monitored: **Radio Northern** (presumed) 3345, 1143-1203 (John Wilkins, Wheat Ridge, CO); **Radio Western** (presumed) 3305, 1210-1218 (Chuck Bolland, Clewiston, FL); **Radio East Sepik** (presumed) 3335, 1235-1244; **Radio Bougainville** 3325, 1244-1320 (Howard).

1013 UTC on 6890
USA: KNLS-Anchors Point, Alaska. Promo for, "America's Last Frontier-Alaska." Religious scriptures part of *True Stories of the Bible* program, followed by ID and *Good News* program. Intermittent fading as program changes to pop music tunes from the '80s and '90s including brief snippets on the artist. Featured '80's tune *Only the Lonely*, by

the Motels. Fair-good signal, monitored to 1045 (Gayle Van Horn, NC). 7370, 1103-1112 (Russian). Very weak/poor under band noise (Barbour).
🔊 On-demand audio www.knls.org

1034 UTC on 9680
INDONESIA: RRI-Jakarta. Studio programming with reporter's phone comments on Jakarta, Guinea and Africa. Canned promotional to nice RRI identification at 1046 and reporter's update continued. Full ID routine at 1059, co-channel interference from unidentified station (Valko). Indo's monitored in Indonesian: **RRI-Fak-Fak** 4790, 1200 (Wilkins) **RRI-Makassar** 4750, 1034-1120 (Bolland); **RRI-Palangkaraya** 3325, 1244-1320; **Voice of Indonesia** 9524.96, 1302-1336 (Howard).

1127 UTC on 2325
AUSTRALIA: VL8T Tennant Creek. Motown music from the '60s era to 1130. ABC news to return of oldies music format. Good signal on // 2485 (ABC NT Svc. Katherine) // 2310 (ABC NT Svc. Alice Springs) covered by local mixing product of AM station (Wilkins). Radio Australia 13690 (Shepparton) 0416-0442 (Howard).

1228 UTC on 9400
PHILIPPINES: FEBC. Chinese conversation from male/female duo. Contemporary Christian music at 1229 to brief musical theme at 1230. Program announcements resuming to music selections. Poor signal quality to 1237 tune-out (Evans). **Radio Veritas Asia** 9615 (Mandarin) 1105-1117 (Barbour). Website: www.febcintl.org

1402 UTC on 6049.60v
MALAYSIA: Radio Suara Islam. Vernacular service. Reciting from the Qu'ran. Looking for possible new station ID, but noted usual "Radio Suara Islam FM" and "Radio Suara Islam, Kuala Lumpur." Observed station had transmitter problems, as pre-1400 (Asyik FM) had open carrier with no audio. **Voice of Malaysia** 11884.66v, 1227-1229* (Howard).

2023 UTC on 15190
EQUATORIAL GUINEA: (tentative) Radio Africa (Bata). Sermon in progress discussing Israelites with bible scriptures from the Old Testament. Religious hymns of contemporary Christian music by group *Gold City. Gospel Echo* program of text and scriptures. Continued program format and fair signal quality. *Old Rugged Cross* theme music at several intervals. Audible to 2100 despite fading (Van Horn). **Radio Nacional** 6250, 0550-0620 (Spanish) African highlife music to Spanish announcement and possible news at 0605. "Radio Malabo" ID // 5005 weaker (Alexander).

2110 UTC on 7255
NIGERIA: Voice of Nigeria. Tune-in to announcer's French text to African highlife music. Signal mostly clear with minimal fading (SIO 43+3-4). Items discussing Madagascar to highlife musical bridge at 2129. Continued focus on Madagascar and Mozambique. French station ID at 2124 including kilohertz quote and reference to Lagos, Nigeria plus contact address. African pop music interspersed with French to 2131. English intros into news updates and highlife music variety (Van Horn).
🔊 Streaming/on-demand audio www.voiceofnigeria.org

2150 UTC on 9870
SAUDI ARABIA: BSKSA. First General Program in Arabic (SIO 444) // 9555 to Africa (SIO 343). Arabic segments of music, announcer's talk and featured music program. BSKSA, Holy Qu'ran in Arabic 11820 (to Europe, SIO 444) // 11915 (to Africa, SIO 43+4) (Van Horn). BSKSA 15285, 0403 (Howard).
🔊 Streaming audio www.saudiradio.net

Additional loggings excluded for space constraints are posted as **Blog Logs** on the **Shortwave Central Blog** at the above web address.

Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times
English broadcast unless otherwise noted.

Name That Tune!

I can name that tune in three notes...

I love most types of music (except polka), and of course I have my favorites. I grew up surrounded by music, and it continues to play a very important role in my life today. Combine music with shortwave listening and a world of musical varieties is as close as the radio dial.

I seem to have a gift for identifying music genres, eras, country of origin, artist and song titles (a real plus for a rousing game of trivia). Recently, though, I was thrown a curve ball, and that's where this month's tip to our readers comes in.

As you gather program details for a reception report and that familiar tune is played, but the title or artist escapes you, all is not lost.

If you have an iTunes account on your computer from **www.itunes.com**, go to the top pull-down menu and click on the Store/Home link. Perhaps you know a portion or the complete song title, but not the artist. By entering either into the search field, iTunes will list every song by that title and every artist in their database. The same applies by entering the artist name to search for the song title. From there you can play a 30 second audio sample of the song.

No iTunes account? No problem. Go to Amazon **www.amazon.com** or Barnes & Noble **www.barnesandnoble.com** and type in either the artist or song title in the Search field under Music to find the artist and music samples. Don't forget, too, that amazing wonder of wonders, Google at **www.google.com**. A song lyric or portion of lyric will work when you've hummed a tune for days. The same applies for Yahoo! **www.yahoo.com**, Wikipedia **www.wikipedia.com**, or You Tube **www.youtube.com.**

If that doesn't work or if you're not computer savvy, call your local radio station. Trust me: the on-air jock can tell you the artist or song title by description. However, I'm told they'd prefer that, if you call, no singing please!

By reporting the correct title and artist, it leaves no doubt that you heard station XYZ, and is certainly more convincing than reporting "pop music, unknown artist."

Oh, and the artist that threw me the curve ball? It was Stealers Wheel singing that familiar hit from 1972, *Stuck in the Middle With You*. Thank you, iTunes... I'm saving this one for my next trivia game.

BOSNIA

International Radio of Serbia and Montenegro, 9580 kHz. Partial data Listener's Club card. Received in 1,445 days for an English report, local postcard, applause card, and $1.00US. Station address: P.O. Box 200, Hilandarska 2, 11000 Beograd, Serbia. (Joe Wood, Greenback, TN)

BRAZIL

Rádio Clube do Para 4885 kHz. No data verification letter unsigned, plus station postcard, sticker, lapel pin and pennant for one of the dozens of reports I've sent in over the years. Each report contained an English report, local postcard, applause card and most had IRCs or US currency enclosed. Station address: Av. Almirante Barroso N° 2190-3° andar, Marco, 66095-020 Belém, Para, Brazil. (Wood)
🔊 Streaming/on-demand audio www.radioclubedo-para.com.br

Rádio Senado 5990 kHz. Full data station card signed by A. Campos. Received in 56 days for Portuguese/English report sent to radio@senado.gov.br. Station address: Praça dos Três Poderes, Anexo II-Bloco B-Tèeeeo, 70165-900 Brasilia DF, Brazil. (Gayle Van Horn, NC)
🔊 Streaming audio from FM service www.senado.gov.br/radio/ondascurtas.asp

LITHUANIA

Radio Free Asia via Sitkunai 9460 kHz. Full data

RFA's first QSL in their new Asian musical instrument series

Dutar Uyghur instrument card, unsigned. Transmitter site is noted as "Other." QSL card is from the RFA current musical instruments card series. Received in 12 days for an email report to Al Janitschek QSL@rfa.org (Duane Hadley, Bristol, TN) Postal address: Radio Free Asia, Suite 300, 2025 M Street NW, Washington, DC 20036 USA. Website: www.techweb.rfa.org

MEDIUM WAVE

WMT 600 kHz AM, Partial data letter, signed by Randy Lee-Program Director. Received in 72 days for an AM report, address label (not used on reply) and $1.00US (returned). Station address: 600 Old Marion Rd., NE, Cedar Rapids, IA 52402-2152 USA. (Bill Wilkins, Springfield, MO).
🔊 Streaming audio www.wmt.com/

NIGERIA

Voice of Nigeria, 15120 kHz. Full data color scenery card unsigned, plus station sticker and program schedule. Received in 95 days for an English report, two mint stamps, SAE (not used) and souvenir postcards. Station address: 6th Floor, Radio House Herbert Macaulay, Garki, Abuja, Federal Capital Territory, Nigeria. (Sam Wright, Biloxi, MS) Website: www.voiceofnigeria.org

NORTHERN MARIANAS

Voice of America relay via Tinian, 7575 kHz. Full data card with transmitter notation, plus calender, schedules and stickers. Received in 115 days for an English report, local postcard and applause card. Station address: QSL Manager VOA, IBB, Robert E. Kamosa-Transmitter Site, P.O. Box 504969, Saipan, MP 96950 USA (Wood).

RWANDA

Family Radio Worldwide via Kigali relay 11985 kHz. Full data Three Decades of Faithful Service card unsigned, plus religious brochures. Received in 86 days for English report and mint stamps. Station address: 290 Hegenberger Road, Oakland, CA 94621-1436 USA. (T.J. Banks, Dallas, TX) Email reports to: international@familyradio.com
🔊 Streaming audio www.familyradio.com

USA

WRNO, 7505 kHz. Two full data color studio/antenna You'll Rave About the Wave cards, unsigned. Received in 11 days for an English report, SAE (not used), one mint stamp and souvenir postcard. Cards verified email and postal reports. QSL address: WRNO Worldwide, P.O. Box 895, Fort Worth, TX 76101 USA. (Van Horn)
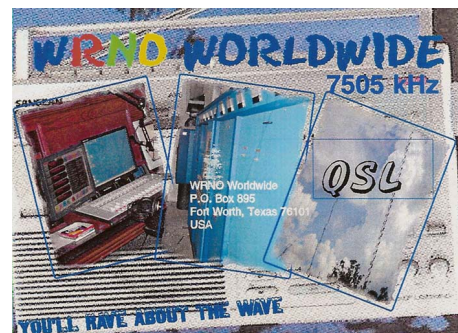
UTILITY

Rohde & Schwarz Experimental Station DI2KM, Munich, Germany, 6770 kHz ALE call MUC. Full data verification letter signed by Felix Erckenbrecht (DG1YFE) with notation that rig in use was R&S M3SR Series 4100, 150 watts. Station now tests on STANAG 4539 and SECOM-H equipment. Station address: Rohde & Schwarz GmbH & Co., KG, Entwicklung, Taktische Radios/HF Radios, P.O. box 80 14 69, 81614 München, Germany. (Thomas M. Rösner, Germany/UDXF)

VCO MCTS Sydney 4416 USB kHz. FAX QSL/Ice Analysis Charts. VCO MCTS verification letter signed by Heather Ozon-Officer-in-Charge. Received in 140 days. Station address: MCTS VCO Sydney, P.O. Box 8630 Sydney, NS B1P 6K7, Canada. (Mauro Giroletti, Italy/UDXF)

Additional QSLs, tips and information excluded for space constraints are posted at the Shortwave Central Blog at http://mt-shortwave.blogspot.com/

HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa   USA, Voice of America   5995am   6130ca   7405am   9455af
①   ②   ⑤   ③   ④   ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all *dates*, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. English broadcasts are listed by UTC time on ① , then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Codes
s/Sun	Sunday
m/Mon	Monday
t	Tuesday
w	Wednesday
h	Thursday
f	Friday
a/Sat	Saturday
occ:	occasional
DRM:	Digital Radio Mondiale
irreg	Irregular broadcasts
vl	Various languages
USB:	Upper Sideband

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas
af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
ca:	Central America
do:	domestic broadcast
eu:	Europe
me:	Middle East
na:	North America
pa:	Pacific
sa:	South America
va:	various

Mode used by all stations in this guide is AM unless otherwise indicated.

MT Monitoring Team

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Larry Van Horn, MT Asst. Editor
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Thank You ...

Additional Contributors to This Month's Shortwave Guide:

AOKI; *BCL News; Ardic DX Club; DX Asia; British DX Club; Cumbre DX*; EIBI; *HFCC; Hard-Core DX; Radio Bulgaria DX Mix News; Play DX 2003; WWDXC*- BC DX, *Top News; World DX Club/Contact.*
Alan Roe, UK; Alexey Zinevich, Russia; Alokesh Gupta, New Delhi, India; Arnulf Piontek, Germany; Daniel Sampson, Ernest Riley/PTSW; Dragan Lekic; Evelyn Marcy/WYFR; Ivo Ivanov; Bulgaria; Jaisakthivel, Chennai, India; José Miguel Romero, Spain; Mike Barraclough, UK; Noel Green, UK; Rachel Baughn/MT; Rich D'Angelo/*NASWA Flash Sheet*, *NASWA Journal*; Tom Taylor, UK; Wolfgang Büeschel, Germany

Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

Notes
Note 1	Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
Note 2	Broadcasters can use this frequency range on a (NIB) non-interference basis only.
Note 3	WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007
Note 4	WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

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0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

Start	Stop	Days	Station	Frequencies
0000	0000		UK, BBC World Service	5970as 6195as 7395as 9410as 9740as 11955as 13725as 15335as 15360as
0000	0005	mtwhf	Canada, R Canada International	6100am
0000	0020		Japan, NHK World Radio Japan	5960eu 6145na 13650as 17810as
0000	0027		Czech Rep, Radio Prague	7345na 9440na
0000	0030		Egypt, Radio Cairo	11590na
0000	0030		Thailand, Radio Thailand World Svc	15275na
0000	0030		USA, Voice of America	7555va
0000	0045		India, All India Radio	9705as 9950as 11620as 11645as
0000	0045		USA, WYFR/Family Radio Worldwide	17805na
0000	0056		Romania, R Romania International	6135na 7535na 9580na
0000	0100		Anguilla, Worldwide Univ Network	6090am
0000	0100		Australia, ABC NT Alice Springs	4835do
0000	0100		Australia, ABC NT Katherine	5025do
0000	0100		Australia, ABC NT Tennant Creek	4910do
0000	0100		Australia, Radio Australia	9660as 12080as 13690as 15240pa 17665as 17715as 17750va 17775va 17795va
0000	0100		Canada, CFRX Toronto ON	6070na
0000	0100		Canada, CFVP Calgary AB	6030na
0000	0100		Canada, CKZN St John's NF	6160na
0000	0100		Canada, CKZU Vancouver BC	6160na
0000	0100		Canada, R Canada International	11700as
0000	0100		China, China Radio International	6020na 6075as 6180as 7415as 9570as 11790as 11885as 13750as 15125as
0000	0100		Germany, Deutsche Welle	9885as 15595as 17525as
0000	0100		Guyana, Voice of Guyana	3291do
0000	0100		Malaysia, RTM/Traxx FM	7295do
0000	0100	DRM	New Zealand, Radio NZ International	13730pa
0000	0100		New Zealand, Radio NZ International	15720pa
0000	0100		Papua New Guinea, Wantok R. Light	7325do
0000	0100		Philippines, Philippine Broadcasting Svc	6170do
0000	0100		Russia, Voice of Russia	9480sa 9665sa
0000	0100		Spain, Radio Exterior de Espana	6055na
0000	0100		Ukraine, R Ukraine International	7440na
0000	0100		USA, American Forces Network	4319usb 5446usb 5765usb 6350usb 7812usb 10320usb 12133usb 12759usb 13362usb
0000	0100		USA, EWTN Vandiver AL	11520af
0000	0100		USA, WBCQ Monticello ME	5110am 7415am
0000	0100		USA, WBOH Newport NC	5920am
0000	0100		USA, WHRA Greenbush ME	7385eu
0000	0100		USA, WHRI Cypress Creek SC	5875na 7315va
0000	0100		USA, WINB Red Lion PA	9265am
0000	0100		USA, WRMI Miami FL	9955ca
0000	0100		USA, WTJC Newport NC	9370na
0000	0100		USA, WWCR Nashville TN	5070na 5935na 7465na 9980na
0000	0100		USA, WWRB Manchester TN	3185va 5050va 5745va 6890va
0000	0100		USA, WYFR/Family Radio Worldwide	5950na 6985na 7335as 9420as 9505sa 9835as 15440am
0000	0100	vl	Zambia CVC/ The Voice Africa	4965af
0005	0100		Canada, R Canada International	6100am
0025	0100		Sri Lanka, SLBC	6005as 9770as 15745as
0030	0045	twhfas	Albania, Radio Tirana	9345na
0030	0045	Sun	Germany, Pan American BC	9640as
0030	0058	mtwhfa	Serbia, International Radio of Serbia	9675na
0030	0100		Australia, Radio Australia	15415as 17665as
0030	0100		China, China Radio International	11730na
0030	0100		Thailand, Radio Thailand World Svc	12120na
0030	0100	asf	UK, Bible Voice Broadcasting	9490as
0030	0100		USA, Voice of America/Special English	7430as 9715as 9780as 11725as 15205as 15560as 17820as
0030	0100		Uzbekistan, CVC Intl-The Voice Asia	11800as

0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

Start	Stop	Days	Station	Frequencies
0100	0105		Canada, R Canada International	6100am
0100	0127		Czech Rep, Radio Prague	6200na 7345na
0100	0127		Slovakia, R Slovakia International	5930am 9440am
0100	0128		Serbia, International Radio of Serbia	9675na
0100	0130		Australia, Radio Australia	9660as 12080as 13690as 15240pa 17665as 17715as 17750va 17775va 17795va
0100	0130		Vietnam, Voice of Vietnam	6175na
0100	0157		North Korea, Voice of Korea	7140as 9345as 9730as 11735sa 13760sa 15180sa
0100	0200		Anguilla, Worldwide Univ Network	6090am
0100	0200		Australia, ABC NT Alice Springs	4835do
0100	0200		Australia, ABC NT Katherine	5025do
0100	0200		Australia, ABC NT Tennant Creek	4910do
0100	0200		Canada, CFRX Toronto ON	6070na
0100	0200		Canada, CFVP Calgary AB	6030na
0100	0200		Canada, CKZN St John's NF	6160na
0100	0200		Canada, CKZU Vancouver BC	6160na
0100	0200		Canada, R Canada International	9620as
0100	0200		China, China Radio International	6080na 6175as 9410eu 9470eu 9535as 9580na 9790na 11870na 15125as 15785as
0100	0200		Cuba, Radio Havana Cuba	6000na 6140na
0100	0200		Guyana, Voice of Guyana	3291do
0100	0200		Malaysia, RTM/Traxx FM	7295do
0100	0200	DRM	New Zealand, Radio NZ International	13730pa
0100	0200		New Zealand, Radio NZ International	15720pa
0100	0200		Palau, T8WH/World Harvest	15710as
0100	0200		Papua New Guinea, Wantok R. Light	7325do
0100	0200		Philippines, Philippine Broadcasting Svc	6170do
0100	0200		Russia, Voice of Russia	9480sa 9665sa
0100	0200		Sri Lanka, SLBC	6005as 9770as 15745as
0100	0200		Taiwan, R Taiwan International	11875as
0100	0200		UK, BBC World Service	7395as 9410as 9740as 11750as 11955as 15310as 15335as 15360as 17615as
0100	0200		USA, American Forces Network	4319usb 5446usb 5765usb 6350usb 7812usb 10320usb 12133usb 12759usb 13362usb
0100	0200		USA, EWTN Vandiver AL	11520af
0100	0200		USA, KJES Vado NM	7555na
0100	0200		USA, Voice of America	7430va 9780va 11705va
0100	0200	mtwhfa	USA, WBCQ Monticello ME	5110am 7415am
0100	0200		USA, WBOH Newport NC	5920am
0100	0200		USA, WHRA Greenbush ME	7385eu
0100	0200		USA, WHRI Cypress Creek SC	5875na 7315va
0100	0200	mtwhf	USA, WHRI Cypress Creek SC	5850na 7315na
0100	0200	Sat/Sun	USA, WHRI Cypress Creek SC	7315na
0100	0200		USA, WINB Red Lion PA	9265am
0100	0200		USA, WRMI Miami FL	9955ca
0100	0200		USA, WRNO New Orleans LA	7505am
0100	0200		USA, WTJC Newport NC	9370na
0100	0200		USA, WWCR Nashville TN	5070na 5935na 7465na 9980na
0100	0200		USA, WWRB Manchester TN	3185va 5050va 5745va 6890va
0100	0200		USA, WYFR/Family Radio Worldwide	5950na 6985na 7335sa 9420sa 9505na 15440am
0100	0200		Uzbekistan, CVC Intl-The Voice Asia	11790as 11880as
0100	0200	vl	Zambia CVC/ The Voice Africa	4965af
0130	0200		Australia, Radio Australia	9660as 12080as 13690as 15240pa 15415as 17665as 17715va 17750va 17795va
0130	0200		Iran, VOIRI/ IRIB	7235na 9495na
0130	0200		Sweden, Radio Sweden	6010na
0130	0200	twhfa	USA, Voice of America/Special English	6040ca 9820ca
0140	0200		Vatican City, Vatican Radio	5915as 7335as
0145	0200	twhfas	Albania, Radio Tirana	7425na

0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

Start	Stop	Days	Station	Frequencies
0200	0227		Iran, VOIRI/ IRIB	7235na 9495na
0200	0230		Thailand, Radio Thailand World Svc	15275na
0200	0230		USA, KJES Vado NM	7555na
0200	0245		USA, WYFR/Family Radio Worldwide	11835am
0200	0257		North Korea, Voice of Korea	13650as 15100as
0200	0258	Sun	Lithuania, Mighty KBC Radio	6110na
0200	0300		Anguilla, Worldwide Univ Network	6090am
0200	0300		Argentina, Radio Nacional RAE	11710am
0200	0300		Australia, ABC NT Alice Springs	4835do
0200	0300		Australia, ABC NT Katherine	5025do
0200	0300		Australia, ABC NT Tennant Creek	4910do
0200	0300		Australia, Radio Australia	9660as 12080as 13690as 15240pa 15415as 15515as 17750va 21725va
0200	0300	DRM	Bulgaria, Radio Bulgaria	9500na
0200	0300		Bulgaria, Radio Bulgaria	9700na 11700na

0200	0300		Canada, CFRX Toronto ON	6070na		
0200	0300		Canada, CFVP Calgary AB	6030na		
0200	0300		Canada, CKZN St John's NF	6160na		
0200	0300		Canada, CKZU Vancouver BC	6160na		
0200	0300		China, China Radio International		11770as	
			13640as			
0200	0300		Cuba, Radio Havana Cuba	6000na	6140na	
0200	0300		Egypt, Radio Cairo	7540na		
0200	0300		Guyana, Voice of Guyana	3291do		
0200	0300		Indonesia, Voice of Indonesia	9526va	11784al	
0200	0300		Malaysia, RTM/Traxx FM	7295do		
0200	0300	DRM	New Zealand, Radio NZ International	13730pa		
0200	0300		New Zealand, Radio NZ International	15720pa		
0200	0300		Palau, T8WH/World Harvest	15710as		
0200	0300		Papua New Guinea, Wantok R. Light	7325do		
0200	0300		Philippines, Philippine Broadcasting Svc	6170do		
0200	0300		Philippines, Radyo Pilipinas	11880va	15285va	
			15510va			
0200	0300		Russia, Voice of Russia	9480sa	9665sa	
			15425na			
0200	0300		South Korea, KBS World Radio	9580sa		
0200	0300		Sri Lanka, SLBC	6005as	9770as	15745as
0200	0300		Taiwan, R Taiwan International		5950na	
			9680na			
0200	0300	mtwhf	Uganda, UBC Radio	4976do		
0200	0300		UK, BBC World Service	6005af	6195me	
			9410eu	11955as	15310as	
0200	0300		USA, American Forces Network		4319usb	
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
0200	0300		USA, EWTN Vandiver AL	11520af		
0200	0300	mtwhfa	USA, WBCQ Monticello ME	5110am	7415am	
0200	0300		USA, WBOH Newport NC	5920am		
0200	0300		USA, WHRA Greenbush ME	7385eu		
0200	0300		USA, WHRI Cypress Creek SC		5875na	
			7315va			
0200	0300		USA, WINB Red Lion PA	9265am		
0200	0300	smtwhfa	USA, WRMI Miami FL	9955am		
0200	0300		USA, WRNO New Orleans LA	7505am		
0200	0300		USA, WTJC Newport NC	9370na		
0200	0300		USA, WWCR Nashville TN	3215na	5070na	
			5890na	5935na		
0200	0300		USA, WWRB Manchester TN	3185va	5050va	
			5745va	6890va		
0200	0300		USA, WYFR/Family Radio Worldwide		9385va	
0200	0300		USA, WYFR/Family Radio Worldwide		5985sa	
			6985na	7335sa	9420sa	9505na
			9680am	11855sa		
0200	0300		Uzbekistan, CVC Intl-The Voice Asia		11790as	
			11880as			
0200	0300		Vatican City, Vatican Radio	9310va	12070va	
0200	0300	vl	Zambia CVC/ The Voice Africa		4965af	
0215	0230		Nepal, Radio Nepal	5005as		
0230	0300	twhfas	Albania, Radio Tirana	7425na		
0230	0300		China, China Radio International		15435as	
0230	0300		Malaysia, RTM/Voice of Malaysia		15295pa	
0230	0300		Sweden, Radio Sweden	6010na	11550va	
0230	0300		Vietnam, Voice of Vietnam	6175na		
0245	0300		Australia, HCJB Global	15400as		
0250	0300		Vatican City, Vatican Radio	6040na	7305na	
0255	0300		Rwanda, Radio Rwanda	6055do		

0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0320		Vatican City, Vatican Radio	6040am	7305na	
			9545as			
0300	0327		Czech Rep, Radio Prague	7345na	9870na	
0300	0330		Egypt, Radio Cairo	7540na		
0300	0330		Philippines, Radyo Pilipinas	11880va	15285va	
			15510va			
0300	0330		Uzbekistan, CVC Intl-The Voice Asia		11800as	
			11880as			
0300	0330		Vatican City, Vatican Radio	7360af	9310va	
			9660af	12070va		
0300	0355		Turkey, Voice of Turkey	5975va	6165me	
			7325va			
0300	0356		Romania, R Romania International		6150na	
			9645na	9735as	11895as	
0300	0357		North Korea, Voice of Korea	7140as	9345as	
			9730as			
0300	0400		Anguilla, Worldwide Univ Network	6090am		
0300	0400		Australia, ABC NT Alice Springs		4835do	
0300	0400		Australia, ABC NT Katherine	5025do		
0300	0400		Australia, ABC NT Tennant Creek		4910do	
0300	0400		Australia, Radio Australia	9660as	12080as	
			13690as	15240pa	15415as	15515as
			17750va	21725va		

0300	0400	twhfas	Canada, CBC NQ SW Service	9625na		
0300	0400		Canada, CFRX Toronto ON	6070na		
0300	0400		Canada, CFVP Calgary AB	6030na		
0300	0400		Canada, CKZN St John's NF	6160na		
0300	0400		Canada, CKZU Vancouver BC	6160na		
0300	0400		China, China Radio International		9690na	
			9790na	11770as	13750na	15110as
			15120na	15785as		
0300	0400		Cuba, Radio Havana Cuba	6000na	6140na	
0300	0400		Germany, Deutsche Welle	11975as	13770as	
			15595as			
0300	0400		Guyana, Voice of Guyana	3291do		
0300	0400		Malaysia, RTM/Traxx FM	7295do		
0300	0400		Malaysia, RTM/Voice of Malaysia		6175as	
			9750as	15295as		
0300	0400	DRM	New Zealand, Radio NZ International	13730pa		
0300	0400		New Zealand, Radio NZ International	15720pa		
0300	0400		Oman, Radio Oman	15355as		
0300	0400		Palau, T8WH/World Harvest	15700as		
0300	0400		Papua New Guinea, Wantok R. Light	7325do		
0300	0400		Philippines, Philippine Broadcasting Svc	6170do		
0300	0400	DRM	Russia, Voice of Russia	15735as		
0300	0400		Russia, Voice of Russia	9665sa	15425na	
			15585as	15755as		
0300	0400		Rwanda, Radio Rwanda	6055do		
0300	0400		South Africa, Channel Africa	3345af	6135af	
0300	0400		Sri Lanka, SLBC	6005as	9770as	15745as
0300	0400		Sweden, Radio Sweden	6010na		
0300	0400		Taiwan, R Taiwan International		5950na	
			15320as			
0300	0400	mtwhf	Uganda, UBC Radio	4976do		
0300	0400		UK, BBC World Service	3255af	6005af	
			6145af	6190af	6195as	7255af
			9410eu	9750af	12035af	12095as
			15310as	17790as		
0300	0400		Ukraine, R Ukraine International		7440na	
0300	0400		USA, American Forces Network		4319usb	
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
0300	0400		USA, EWTN Vandiver AL	11520af		
0300	0400		USA, Voice of America	4930af	6080af	
			9885af	15580af		
0300	0400	twhfa	USA, WBCQ Monticello ME	7415am		
0300	0400		USA, WBOH Newport NC	5920am		
0300	0400		USA, WHRA Greenbush ME	7385eu		
0300	0400		USA, WHRI Cypress Creek SC		5875na	
			7315na			
0300	0400		USA, WRMI Miami FL	9955am		
0300	0400		USA, WRNO New Orleans LA	7505am		
0300	0400		USA, WTJC Newport NC	9370na		
0300	0400		USA, WWCR Nashville TN	3215na	5070na	
			5890na	5935na		
0300	0400		USA, WWRB Manchester TN	3185va	5050va	
			5745va	6890va		
0300	0400		USA, WYFR/Family Radio Worldwide		6915na	
			6985na	11740na	15255am	
0300	0400		USA, WYFR/Family Radio Worldwide		9385va	
0300	0400		Uzbekistan, CVC Intl-The Voice Asia		13680as	
0300	0400	vl	Zambia CVC/ The Voice Africa		4965af	
0330	0357		Czech Rep, Radio Prague	9445na	11600na	
0330	0400	twhfas	Albania, Radio Tirana	7425na		
0330	0400		UK, BBC World Service	11945af		
0330	0400		Uzbekistan, CVC Intl-The Voice Asia		15555as	
0330	0400		Vietnam, Voice of Vietnam	6175na		
0345	0400	Sat/Sun	Uganda, UBC Radio	4976do		

0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0430		Australia, Radio Australia	9660as	12080as	
			13690as	15160as	15240pa	15515as
			17750va	21725va		
0400	0430	mtwhf	France, Radio France International		9805af	
			11995af			
0400	0445		USA, WYFR/Family Radio Worldwide		6985na	
			9505na			
0400	0458	DRM	New Zealand, Radio NZ International	13730pa		
0400	0458		New Zealand, Radio NZ International	15720pa		
0400	0500		Anguilla, Worldwide Univ Network	6090am		
0400	0500		Australia, ABC NT Alice Springs	4835do		
0400	0500		Australia, ABC NT Katherine	5025do		
0400	0500		Australia, ABC NT Tennant Creek	4910do		
0400	0500	twhfas	Canada, CBC NQ SW Service	9625na		
0400	0500		Canada, CFRX Toronto ON	6070na		
0400	0500		Canada, CKZN St John's NF	6160na		
0400	0500		Canada, CKZU Vancouver BC	6160na		
0400	0500		China, China Radio International		6020na	
			6080na	6190na	13750as	15120as

			15785as	17730as	17855as
0400	0500		Cuba, Radio Havana Cuba	6000na	6140na
0400	0500		Germany, Deutsche Welle	6180af	7245af
			12045af	15445af	
0400	0500		Guyana, Voice of Guyana	3291do	
0400	0500		Malaysia, RTM/Traxx FM	7295do	
0400	0500		Malaysia, RTM/Voice of Malaysia		6175as
			9750as	15295as	
0400	0500		Palau, T8WH/World Harvest	15700as	
0400	0500		Papua New Guinea, Wantok R. Light	7325do	
0400	0500		Philippines, Philippine Broadcasting Svc	6170do	
0400	0500	DRM	Russia, Voice of Russia	15735as	
0400	0500		Russia, Voice of Russia	13755na	15585as
			15755as		
0400	0500		Rwanda, Radio Rwanda	6055do	
0400	0500		South Africa, Channel Africa	3345af	
0400	0500		Sri Lanka, SLBC 6005as	9770as	15745as
0400	0500		Uganda, UBC Radio	4976do	
0400	0500	DRM	UK, BBC World Service	3995eu	
0400	0500		UK, BBC World Service	3255af	
			6190af	7255af	7310af	9410eu
			11945af	12035af	12095as	13675eu
			15310as	15360as	17790as
0400	0500		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
0400	0500		USA, EWTN Vandiver AL	11520af	
0400	0500		USA, Voice of America	4930af	4960af
			6080af	9885af	15580af
0400	0500		USA, WBOH Newport NC	5920am	
0400	0500		USA, WHRA Greenbush ME	7385eu	
0400	0500		USA, WHRI Cypress Creek SC		5875na
			7315va		
0400	0500	smtwhf	USA, WHRI Cypress Creek SC		5850na
0400	0500	Sat	USA, WHRI Cypress Creek SC		9825na
0400	0500		USA, WRMI Miami FL	9955am	
0400	0500		USA, WTJC Newport NC	9370na	
0400	0500		USA, WWCR Nashville TN	3215na	5070na
			5890na	5935na	
0400	0500		USA, WWRB Manchester TN 3185va		5745va
0400	0500		USA, WYFR/Family Radio Worldwide		5950na
			6915na	9680na	
0400	0500		Uzbekistan, CVC Intl-The Voice Asia		13680as
			15555as		
0400	0500	vl	Zambia CVC/ The Voice Africa		4965af
			9430af		
0430	0500		Australia, Radio Australia 9660as		12080as
			13690as	15240pa	15415as	15515as
			17750va	21725va	
0430	0500	mtwh	Italy, NEXUS/IRRS 5990va		
0430	0500		Nigeria, Radio Nigeria/Kaduna		6090do
0450	0500		Swaziland, TWR 3200af		
0459	0500	DRM	New Zealand, Radio NZ International	11675pa	
0459	0500		New Zealand, Radio NZ International	11725pa	

0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0507	twhfas	Canada, CBC NQ SW Service	9625na	
0500	0525		Swaziland, TWR 3200af		
0500	0530		Australia, Radio Australia 9660as		12080as
			13690as	15160as	15240pa	15515as
			17750va		
0500	0530	mtwhf	France, Radio France International		11995af
			13680af	15160as	
0500	0530		Germany, Deutsche Welle	6180af	7430af
			9700af	9825af	
0500	0530	mtwh	Italy, NEXUS/IRRS 5990va		
0500	0530		Japan, NHK World Radio Japan		5975eu
			6110na	11970af	15325as	17810as
0500	0530		Vatican City, Vatican Radio	4005eu	5965eu
			7250eu	9660af	11625af	13765af
0500	0600		Anguilla, Worldwide Univ Network	6090am	
0500	0600		Australia, ABC NT Alice Springs	4835do	
0500	0600		Australia, ABC NT Katherine 5025do		
0500	0600		Australia, ABC NT Tennant Creek	4910do	
0500	0600		Bhutan, Bhutan Broadcasting Svc	6035as	
0500	0600		Canada, CFRX Toronto ON 6070na		
0500	0600		Canada, CKZN St John's NF 6160na		
0500	0600		Canada, CKZU Vancouver BC	6160na	
0500	0600		China, China Radio International		6020na
			11710na	11880na	11895na	15350as
			15465as	17505va	17540as	17730as
			17855as		
0500	0600		Cuba, Radio Havana Cuba	6000na	6010na
			6140na	11760na	
0500	0600	DRM	Germany, Deutsche Welle	17525as	
0500	0600		Guyana, Voice of Guyana	3291do	

Right column:

0500	0600		Kuwait, Radio Kuwait	15110va	
0500	0600		Malaysia, RTM/Traxx FM	7295do	
0500	0600		Malaysia, RTM/Voice of Malaysia		6175as
			9750as	15295as	
0500	0600	DRM	New Zealand, Radio NZ International	11675pa	
0500	0600		New Zealand, Radio NZ International	11725pa	
0500	0600		Nigeria, Radio Nigeria/Kaduna	4770do	
0500	0600		Palau, T8WH/World Harvest 15700as		
0500	0600		Papua New Guinea, Wantok R. Light	7325do	
0500	0600		Philippines, Philippine Broadcasting Svc	6170do	
0500	0600		Russia, Voice of Russia	13755na	
0500	0600		South Africa, Channel Africa	7230af	
0500	0600		Taiwan, R Taiwan International		5950na
0500	0600		Uganda, UBC Radio	4976do	
0500	0600	DRM	UK, BBC World Service	3995af	
0500	0600		UK, BBC World Service	3255af	3995eu
			6005af	6190af	7255af	7310af
			9410eu	11945af	12095as	15310as
			15360as	15420af	15565eu	17640af
			17790as		
0500	0600		Ukraine, R Ukraine International		7440na
0500	0600		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
0500	0600		USA, EWTN Vandiver AL	11520af	
0500	0600		USA, Voice of America	4930af	6080af
			12080af	15580af	
0500	0600		USA, WBOH Newport NC	5920am	
0500	0600		USA, WHRA Greenbush ME	7390af	
0500	0600		USA, WHRI Cypress Creek SC		5875na
			11565na		
0500	0600	Sun	USA, WHRI Cypress Creek SC		7365na
0500	0600		USA, WRMI Miami FL	9955am	
0500	0600		USA, WTJC Newport NC	9370na	
0500	0600		USA, WWCR Nashville TN	3215na	5070na
			5890na	5935na	
0500	0600		USA, WWRB Manchester TN 3185va		
0500	0600		USA, WYFR/Family Radio Worldwide		5950na
			6915na	9680na	
0500	0600		Uzbekistan, CVC Intl-The Voice Asia		13680as
			15555as		
0500	0600	vl	Zambia CVC/ The Voice Africa		4965af
			9430af		
0515	0530		Rwanda, Radio Rwanda	6055do	
0530	0556		Romania, R Romania International		7305eu
			9655eu	15345pa	17760pa	
0530	0600		Australia, Radio Australia 9660as		12080as
			13690as	15160as	15240pa	15415as
			15515as	17750va	
0530	0600		China, Central People's BS/CNR		9530do
			11685do	15570do	
0530	0600		Rwanda, Radio Rwanda	6055do	
0530	0600		Thailand, Radio Thailand World Svc		17655va

0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0603		Croatia, Voice of Croatia	7355eu	
0600	0615	Sat/Sun	South Africa, Trans World Radio		11640af
0600	0630	Sat/Sun	Australia, Radio Australia	15180as	15290as
0600	0630		Australia, Radio Australia 9660as		11650as
			12080as	13690as	15160as	15240pa
			15515as	17750va	
0600	0630	mtwhf	France, Radio France International		9765af
			11610af	15160af	17800af	
0600	0630		Germany, Deutsche Welle	7310af	15275af
0600	0630		Nigeria, Radio, National Svc/Abuja		7275do
0600	0645	mtwhf	South Africa, Trans World Radio		11640af
0600	0645		Swaziland, TWR 11640af		
0600	0658	DRM	New Zealand, Radio NZ International	11675pa	
0600	0658		New Zealand, Radio NZ International	11725pa	
0600	0700		Anguilla, Worldwide Univ Network	6090am	
0600	0700		Australia, ABC NT Alice Springs	4835do	
0600	0700		Australia, ABC NT Katherine 5025do		
0600	0700		Australia, ABC NT Tennant Creek	4910do	
0600	0700		Canada, CFRX Toronto ON 6070na		
0600	0700		Canada, CFVP Calgary AB 6030na		
0600	0700		Canada, CKZN St John's NF 6160na		
0600	0700		Canada, CKZU Vancouver BC	6160na	
0600	0700		China, China Radio International		11710af
			11870as	11880as	11895as	13660as
			15140as	15350as	15465as	17505va
			17540as	17710as	
0600	0700		Cuba, Radio Havana Cuba	6000na	6010na
			6140na	11760na	
0600	0700	DRM	Germany, Deutsche Welle	3995eu	6130eu
0600	0700		Greece, Voice of Greece	11645eu	
0600	0700		Guyana, Voice of Guyana	3291do	

Start	Stop	Days	Station	Freq	Freq	Freq	Freq
0600	0700		Kuwait, Radio Kuwait	15110va			
0600	0700		Liberia, ELWA	4760do	6070al		
0600	0700		Malaysia, RTM/Traxx FM	7295do			
0600	0700		Malaysia, RTM/Voice of Malaysia	6175as			
			9750as	15295as			
0600	0700		Nigeria, Radio Nigeria/Kaduna	4770do			
0600	0700		Nigeria, Voice of Nigeria/Lagos	15120af			
0600	0700		Palau, T8WH/World Harvest	15700as			
0600	0700		Papua New Guinea, Wantok R. Light	7325do			
0600	0700		Philippines, Philippine Broadcasting Svc	6170do			
0600	0700		Russia, Voice of Russia	17635pa			
0600	0700		South Africa, Channel Africa	7230af			
0600	0700		UK, BBC World Service	3995eu	6005af		
			6190af	9410af	9860af	11765af
			12015af	12095as	15310as	17640af
			17790as			
0600	0700	Sat/Sun	UK, BBC World Service	15420af			
0600	0700		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
0600	0700		USA, EWTN Vandiver AL	11520af			
0600	0700		USA, Voice of America	6080af	12080af		
			15580af			
0600	0700		USA, WBOH Newport NC	5920am			
0600	0700		USA, WHRA Greenbush ME	7390af			
0600	0700		USA, WHRI Cypress Creek SC	5875va			
			7365na	11565na			
0600	0700		USA, WRMI Miami FL	9955am			
0600	0700		USA, WTJC Newport NC	9370na			
0600	0700		USA, WWCR Nashville TN	3215na	5070na		
			5890na	5935na			
0600	0700		USA, WWRB Manchester TN	3185va			
0600	0700		USA, WYFR/Family Radio Worldwide	5850eu			
			7520sa	9680va	11530va	11580va
0600	0700		Uzbekistan, CVC Intl-The Voice Asia	15555as			
0600	0700		Vanuatu, Radio Vanuatu	3945do	7260do		
0600	0700	vl	Zambia CVC/ The Voice Africa	6065af			
			13590af				
0630	0645		Vatican City, Vatican Radio	4005eu	5965eu		
			7250eu	9645eu	11740eu	15595me
0630	0700		Australia, Radio Australia	9660as	11650as		
			12080as	13690as	15160as	15240pa
			15415as	15515as	17750va	
0630	0700		Bulgaria, Radio Bulgaria	9600eu	11600eu		
0630	0700		Swaziland, TWR	3200af			
0645	0700	Sun	Germany, TWR Europe	6105eu			
0645	0700	Sun	Monaco, TWR Europe	9800eu			
0659	0700	DRM	New Zealand, Radio NZ International	7285pa			
0659	0700		New Zealand, Radio NZ International	6170pa			

0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

Start	Stop	Days	Station	Freq	Freq	Freq	Freq
0700	0727		Czech Rep, Radio Prague	9880eu	11600na		
0700	0727		Slovakia, R Slovakia International	9440va			
			11650va				
0700	0730		France, Radio France International	13675af			
0700	0730	Sun	UK, Bible Voice Broadcasting	5945eu			
0700	0745		USA, WYFR/Family Radio Worldwide	7520eu			
0700	0750	smtwhf	Germany, TWR Europe	6105eu			
0700	0750	smtwhf	Monaco, TWR Europe	9800eu			
0700	0800		Anguilla, Worldwide Univ Network	6090am			
0700	0800		Australia, ABC NT Alice Springs	4835do			
0700	0800		Australia, ABC NT Katherine	5025do			
0700	0800		Australia, ABC NT Tennant Creek	4910do			
0700	0800		Australia, Radio Australia	9475as	9660as		
			9710as	11650as	11945as	12080as
			13630pa	15160as	15240pa	17750va
0700	0800		Bhutan, Bhutan Broadcasting Svc	6035as			
0700	0800		Canada, CFRX Toronto ON	6070na			
0700	0800		Canada, CFVP Calgary AB	6030na			
0700	0800		Canada, CKZN St John's NF	6160na			
0700	0800		Canada, CKZU Vancouver BC	6160na			
0700	0800		China, China Radio International	11880as			
			11895as	13660as	13710eu	15125as
			15350as	15465as	17490eu	17540as
			17710as				
0700	0800	mtwhf	Equatorial Guinea, Radio Africa # 2	15190af			
0700	0800	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af			
0700	0800	DRM	Germany, Deutsche Welle	5790eu	9545eu		
0700	0800		Guyana, Voice of Guyana	3291do			
0700	0800		Kuwait, Radio Kuwait	15110va			
0700	0800	Sat	Latvia, Radio SWH	9290eu			
0700	0800		Liberia, ELWA	4760do	6070al		
0700	0800		Malaysia, RTM/Traxx FM	7295do			
0700	0800		Malaysia, RTM/Voice of Malaysia	6175as			
			9750as	15295as			
0700	0800		Myanmar, Myanma Radio	9731do			

Start	Stop	Days	Station	Freq	Freq	Freq	Freq
0700	0800	DRM	New Zealand, Radio NZ International	7285pa			
0700	0800		New Zealand, Radio NZ International	6170pa			
0700	0800		Nigeria, Radio Nigeria/Kaduna	4770do			
0700	0800		Palau, T8WH/World Harvest	9930as	15700as		
0700	0800		Papua New Guinea, R East New Britain	3385do			
0700	0800		Papua New Guinea, Wantok R. Light	7325do			
0700	0800		Philippines, Philippine Broadcasting Svc	6170do			
0700	0800		Russia, Voice of Russia	17635as	21790as		
0700	0800		South Africa, Channel Africa	7230af			
0700	0800		Swaziland, TWR	3200af			
0700	0800	Sat/Sun	UK, BBC World Service	15420af			
0700	0800		UK, BBC World Service	5790af	6190af		
			9860af	11760me	11765af	13820af
			15310af	15400af	15575as	17790as
			17830af				
0700	0800		USA, American Forces Network	4319usb			
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
0700	0800		USA, EWTN Vandiver AL	11520af			
0700	0800		USA, WBOH Newport NC	5920am			
0700	0800		USA, WHRA Greenbush ME	11565pa			
0700	0800		USA, WHRI Cypress Creek SC	7385va			
			7390na	11565na			
0700	0800		USA, WRMI Miami FL	9955am			
0700	0800		USA, WTJC Newport NC	9370na			
0700	0800		USA, WWCR Nashville TN	3215na	5070na		
			5890na	5935na			
0700	0800		USA, WWRB Manchester TN	3185va			
0700	0800		USA, WYFR/Family Radio Worldwide	5950na			
			5985na	6915na	9385am	9505af
0700	0800		Uzbekistan, CVC Intl-The Voice Asia	15555as			
0700	0800		Vanuatu, Radio Vanuatu	3945do	7260do		
0700	0800	vl	Zambia CVC/ The Voice Africa	6065af			
			13590af				
0715	0750	Sat	Germany, TWR Europe	6105eu			
0715	0750	Sat	Monaco, TWR Europe	9800eu			
0730	0800		Australia, HCJB Global	11750pa			
0730	0800	Sat	UK, Bible Voice Broadcasting	5945eu			
0745	0800	f	UK, Bible Voice Broadcasting	5945eu			

0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

Start	Stop	Days	Station	Freq	Freq	Freq	Freq
0800	0815	Sat	UK, Bible Voice Broadcasting	5945eu			
0800	0830		Australia, ABC NT Alice Springs	4835do			
0800	0830		Australia, ABC NT Katherine	5025do			
0800	0830		Australia, ABC NT Tennant Creek	4910do			
0800	0830		Malaysia, RTM/Voice of Malaysia	6175as			
			9750as	15295as			
0800	0830		Myanmar, Myanma Radio	9731do			
0800	0845		USA, WYFR/Family Radio Worldwide	5950na			
			9385na				
0800	0900		Anguilla, Worldwide Univ Network	6090am			
0800	0900		Australia, HCJB Global	11750pa			
0800	0900		Australia, Radio Australia	5995as	9475as		
			9580va	9590as	9710as	11945pa
			12080as	13630pa			
0800	0900		Bhutan, Bhutan Broadcasting Svc	6035as			
0800	0900		Canada, CFRX Toronto ON	6070na			
0800	0900		Canada, CFVP Calgary AB	6030na			
0800	0900		Canada, CKZN St John's NF	6160na			
0800	0900		Canada, CKZU Vancouver BC	6160na			
0800	0900		China, China Radio International	11620as			
			11880as	11895as	13710eu	15125af
			15350as	15465as	15625as	17490eu
			17540as				
0800	0900	mtwhf	Equatorial Guinea, Radio Africa # 2	15190af			
0800	0900	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af			
0800	0900	DRM	Germany, Deutsche Welle	9545eu	12095as		
			13810eu				
0800	0900		Guyana, Voice of Guyana	3291do			
0800	0900	Sat	Italy, NEXUS/IRRS	9510va			
0800	0900		Liberia, ELWA	4760do	6070al		
0800	0900		Malaysia, RTM/Traxx FM	7295do			
0800	0900	DRM	New Zealand, Radio NZ International	7285pa			
0800	0900		New Zealand, Radio NZ International	6170pa			
0800	0900		Nigeria, Radio Nigeria/Kaduna	4770do			
0800	0900		Nigeria, Voice of Nigeria/Lagos	9690af			
0800	0900		Palau, T8WH/World Harvest	9930as	15700as		
0800	0900		Papua New Guinea, R East New Britain	3385do			
0800	0900		Papua New Guinea, Wantok R. Light	7325do			
0800	0900		Philippines, Philippine Broadcasting Svc	6170do			
0800	0900	DRM	Russia, Voice of Russia	12060eu			
0800	0900		Russia, Voice of Russia	17635as	21790as		
0800	0900		South Africa, Channel Africa	9625af			
0800	0900	Sun	South Africa, SA Radio League	7205af			
			17570af				
0800	0900		South Korea, KBS World Radio	9570as			

0800	0900		Swaziland, TWR 6120af		
0800	0900		UK, BBC World Service	6190af	9860af
			11760me	15310as	15400af	15575as
			17640af	17790as	17830af	21470af
0800	0900		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
0800	0900		USA, EWTN Vandiver AL	11520af	
0800	0900		USA, KNLS Anchor Point AK	7355as	
0800	0900		USA, WBOH Newport NC	5920am	
0800	0900		USA, WHRA Greenbush ME	11565pa	
0800	0900		USA, WHRI Cypress Creek SC		7385va
0800	0900		USA, WRMI Miami FL	9955am	
0800	0900		USA, WTJC Newport NC	9370na	
0800	0900		USA, WWCR Nashville TN	3215na	5070na
				5890na	5935na
0800	0900		USA, WWRB Manchester TN	3185va	
0800	0900		USA, WYFR/Family Radio Worldwide		5985am
			6915na		
0800	0900		Uzbekistan, CVC Intl-The Voice Asia		15555as
0800	0900		Vanuatu, Radio Vanuatu	3945do	7260do
0800	0900	vl	Zambia CVC/ The Voice Africa		6065af
			13590af		
0805	0900	thf	Guam, KTWR/TWR	15190as	
0820	0900	w	Guam, KTWR/TWR	15170as	
0830	0900		Australia, ABC NT Alice Springs		2310do
0830	0900		Australia, ABC NT Katherine 2485do		
0830	0900		Australia, ABC NT Tennant Creek		2325do
0830	0900		Australia, CVC International	15555as	
0835	0900	m	Guam, KTWR/TWR	15170as	
0855	0900	mtwhf	Guam, KTWR/TWR	11840pa	

0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0927		Czech Rep, Radio Prague	9880am	9955na
			21745na		
0900	0930		Australia, HCJB Global	11750pa	
0900	0930	mtwhf	Guam, KTWR/TWR	11840pa	
0900	0930		Japan, NHK World Radio Japan		9625pa
			9825pa	11815as	15590as
0900	0930		Philippines, Philippine Broadcasting Svc		6170do
0900	0930		Uzbekistan, CVC Intl-The Voice Asia		15555as
0900	1000		Anguilla, Worldwide Univ Network		6090am
0900	1000		Australia, ABC NT Alice Springs		2310do
0900	1000		Australia, ABC NT Katherine 2485do		
0900	1000		Australia, ABC NT Tennant Creek		2325do
0900	1000		Australia, Radio Australia	9475va	9580va
			9590va	11945as	12080as
0900	1000		Canada, CFRX Toronto ON	6070na	
0900	1000		Canada, CFVP Calgary AB	6030na	
0900	1000		Canada, CKZN St John's NF	6160na	
0900	1000		Canada, CKZU Vancouver BC6160na		
0900	1000		China, China Radio International		
			15210as	15270eu	15350as	15625af
			17490eu	17570eu	17690va	17750as
0900	1000	mtwhf	Equatorial Guinea, Radio Africa # 2		15190af
0900	1000	Sat/Sun	Equatorial Guinea, Radio East Africa		15190af
0900	1000	DRM	Germany, Deutsche Welle	9545eu	13810eu
0900	1000		Germany, Deutsche Welle	15340as	17705as
0900	1000		Guyana, Voice of Guyana	3291do	
0900	1000		Liberia, ELWA 4760do	6070al	
0900	1000		Malaysia, RTM/Traxx FM	7295do	
0900	1000	DRM	New Zealand, Radio NZ International		7285pa
0900	1000		New Zealand, Radio NZ International		6170pa
0900	1000		Nigeria, Radio Nigeria/Kaduna		4770do
0900	1000		Nigeria, Voice of Nigeria/Lagos		9690af
0900	1000		Palau, T8WH/World Harvest 9930as		15700as
0900	1000		Papua New Guinea, R East New Britain		3385do
0900	1000		Papua New Guinea, Wantok R. Light		7325do
0900	1000	DRM	Russia, Voice of Russia	12060eu	
0900	1000		Russia, Voice of Russia	15470as	15610as
			21790as		
0900	1000		South Africa, Channel Africa 9625af		
0900	1000		Swaziland, TWR 6120af		
0900	1000		UK, BBC World Service	6190af	6195as
			9740as	9860af	11760me	15310as
			15400af	15575as	17640af	17760as
			17790as	17830af	21470af	21660as
0900	1000		Ukraine, R Ukraine International		9950eu
0900	1000		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
0900	1000		USA, EWTN Vandiver AL	11640as	
0900	1000		USA, WBOH Newport NC	5920am	
0900	1000		USA, WHRA Greenbush ME	11565pa	
0900	1000		USA, WHRI Cypress Creek SC		7385va
0900	1000	smtwhf	USA, WHRI Cypress Creek SC		9425na

0900	1000	Sat	USA, WHRI Cypress Creek SC		7465na
0900	1000		USA, WRMI Miami FL	9955am	
0900	1000		USA, WTJC Newport NC	9370na	
0900	1000		USA, WWCR Nashville TN	5070na	5890na
			5935na	9985na	
0900	1000		USA, WWRB Manchester TN	3185va	
0900	1000		USA, WYFR/Family Radio Worldwide		5950na
			6915na	9755as	
0900	1000		Vanuatu, Radio Vanuatu	3945do	7260do
0900	1000	vl	Zambia CVC/ The Voice Africa		6065af
			13590af		
0915	0930	Sat	Guam, KTWR/TWR	11840pa	
0930	1000		Australia, CVC International	15555as	
0930	1000	Sun	Italy, NEXUS/IRRS 9510va		

1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1004		Pakistan, Radio Pakistan	15100as	17835as
1000	1030		Vietnam, Voice of Vietnam	12020as	
1000	1057		Netherlands, R Netherlands Worldwide		11895as
			12065as	15110as	
1000	1057		North Korea, Voice of Korea 11710sa		11735as
			13650sa	15180sa	
1000	1058		New Zealand, Radio NZ International		6170pa
1000	1100		Anguilla, Worldwide Univ Network		11775am
1000	1100		Australia, ABC NT Alice Springs		2310do
1000	1100		Australia, ABC NT Katherine 2485do		
1000	1100		Australia, ABC NT Tennant Creek		2325do
1000	1100		Australia, CVC International	15555as	
1000	1100		Australia, Radio Australia	9475va	9580va
			9590va	11945as	12080as
1000	1100		Canada, CFRX Toronto ON	6070na	
1000	1100		Canada, CFVP Calgary AB	6030na	
1000	1100		Canada, CKZN St John's NF	6160na	
1000	1100		Canada, CKZU Vancouver BC6160na		
1000	1100		China, China Radio International		6040na
			6090as	11610as	11635as	11750na
			13590as	13620as	13720as	15190as
			15350as	17490eu	
1000	1100	mtwhf	Equatorial Guinea, Radio Africa # 2		15190af
1000	1100	Sat/Sun	Equatorial Guinea, Radio East Africa		15190af
1000	1100	DRM	Germany, Deutsche Welle	9545eu	13810eu
1000	1100		Guyana, Voice of Guyana	3291do	
1000	1100		India, All India Radio	7270as	13695va
			15070as	15260as	15410pa	17510pa
			17800pa	17895pa	
1000	1100		Indonesia, Voice of Indonesia 9526va		11784al
1000	1100	Sun	Italy, NEXUS/IRRS 9510va		
1000	1100		Malaysia, RTM/Traxx FM	7295do	
1000	1100	DRM	New Zealand, Radio NZ International		7285pa
1000	1100		Nigeria, Radio Nigeria/Kaduna		4770do
1000	1100		Nigeria, Voice of Nigeria/Lagos		9690af
1000	1100		Palau, T8WH/World Harvest 9930as		15700as
1000	1100		Papua New Guinea, R East New Britain		3385do
1000	1100		Papua New Guinea, Wantok R. Light		7325do
1000	1100		Russia, Voice of Russia	15470as	15610as
1000	1100		Saudi Arabia, BSKSA	15250af	
1000	1100		South Africa, Channel Africa 9625af		
1000	1100		Swaziland, TWR 6120af		
1000	1100	Sat/Sun	UK, BBC World Service	15400af	17830af
1000	1100		UK, BBC World Service	6190af	6195as
			9545eu	9740as	9860af	11760me
			15310af	15575as	17640af	17760as
			17790as	21470af	21660as
1000	1100		USA, American Forces Network		4319usb
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
1000	1100		USA, EWTN Vandiver AL	11640as	
1000	1100		USA, KNLS Anchor Point AK	6890as	
1000	1100		USA, WBOH Newport NC	5920am	
1000	1100		USA, WHRA Greenbush ME	11565pa	
1000	1100		USA, WHRI Cypress Creek SC		7385va
1000	1100		USA, WINB Red Lion PA	9265am	
1000	1100		USA, WRMI Miami FL	9955am	
1000	1100		USA, WTJC Newport NC	9370na	
1000	1100		USA, WWCR Nashville TN	5070na	5890na
			5935na	9985na	
1000	1100		USA, WWRB Manchester TN	3185va	
1000	1100		USA, WYFR/Family Radio Worldwide		5950na
			6890na	6915na	9450sa	9555sa
1000	1100	vl	Zambia CVC/ The Voice Africa		6065af
			13590af		
1015	1045	Sun	UK, Bible Voice Broadcasting 5910as		
1030	1057		Czech Rep, Radio Prague	9880eu	11665eu
1030	1100		Iran, VOIRI / IRIB	15600as	17660as
1030	1100		Mongolia, Voice of Mongolia 9665as		12085as
1059	1100		New Zealand, Radio NZ International		9655pa

1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1103	mtwhf	Croatia, Voice of Croatia	6165eu			
1100	1127		Iran, VOIRI/ IRIB	15600as	17660as		
1100	1130		Australia, CVC International	15555as			
1100	1130		China, China Radio International		6060as		
1100	1130	DRM	Japan, NHK World Radio Japan	9760eu			
1100	1130		Vietnam, Voice of Vietnam	7285as			
1100	1145		USA, WYFR/Family Radio Worldwide	9550am			
			9755sa				
1100	1156		Romania, R Romania International		11775af		
			15210af	15430af	17730af		
1100	1158	DRM	New Zealand, Radio NZ International	7285pa			
1100	1200		Anguilla, Worldwide Univ Network		11775am		
1100	1200		Australia, ABC NT Alice Springs		2310do		
1100	1200		Australia, ABC NT Katherine	2485do			
1100	1200		Australia, ABC NT Tennant Creek		2325do		
1100	1200	DRM	Australia, Radio Australia	5995pa			
1100	1200		Australia, Radio Australia	6020va	9475as		
			9560as	9580va	9590va	11945as	
1100	1200	Sat/Sun	Canada, CBC NQ SW Service	9625na			
1100	1200		Canada, CFRX Toronto ON	6070na			
1100	1200		Canada, CFVP Calgary AB	6030na			
1100	1200		Canada, CKZN St John's NF	6160na			
1100	1200		Canada, CKZU Vancouver BC	6160na			
1100	1200		China, China Radio International		5955as		
			6040na	11650as	11660as	11795as	
			13645as	13650eu	13790eu	17490eu	
1100	1200	mtwhf	Equatorial Guinea, Radio Africa # 2	15190af			
1100	1200	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af			
1100	1200	DRM	Germany, Deutsche Welle	9545eu	13810eu		
1100	1200	Sun	Italy, NEXUS/IRRS	9510va			
1100	1200		Malaysia, RTM/Traxx FM	7295do			
1100	1200		New Zealand, Radio NZ International	9655pa			
1100	1200		Nigeria, Radio Nigeria/Kaduna	4770do			
1100	1200		Nigeria, Voice of Nigeria/Lagos	9690af			
1100	1200		Palau, T8WH/World Harvest	9930as	15700as		
1100	1200		Papua New Guinea, R East New Britain	3385do			
1100	1200		Papua New Guinea, Wantok R. Light	7325do			
1100	1200		Russia, Voice of Russia	12065as	15470as		
1100	1200		Saudi Arabia, BSKSA	15250af			
1100	1200		South Africa, Channel Africa	9625af			
1100	1200		Taiwan, R Taiwan International		7445as		
			11715as				
1100	1200		UK, BBC World Service	6190af	6195as		
			9740as	9860af	9545eu	11760me	
			15310as	15340as	15400af	15575as	
			17640af	17760as	17790as	17830af	
			21470af				
1100	1200		Ukraine, R Ukraine International		9950eu		
1100	1200		USA, American Forces Network		4319usb		
			5446usb	5765usb	6350usb	7812usb	
			10320usb	12133usb	12759usb	13362usb	
1100	1200		USA, EWTN Vandiver AL	11640as			
1100	1200		USA, WBOH Newport NC	5920am			
1100	1200		USA, WHRI Cypress Creek SC		7315va		
			7385va				
1100	1200		USA, WINB Red Lion PA	9265am			
1100	1200		USA, WRMI Miami FL	9955am			
1100	1200		USA, WTJC Newport NC	9370na			
1100	1200		USA, WWCR Nashville TN	5890na	5935na		
			7490na	15825na			
1100	1200		USA, WWRB Manchester TN	3185va			
1100	1200		USA, WYFR/Family Radio Worldwide	5950af			
			5985na	7730sa	9550sa	9625sa	
1100	1200	vl	Zambia CVC/ The Voice Africa		6065af		
			13590af				
1115	1130	mtwhfa	UK, Bible Voice Broadcasting	5945as			
1115	1145	Sun	UK, Bible Voice Broadcasting	5945as			
1130	1200		Australia, CVC International	13635as			
1130	1200		Bulgaria, Radio Bulgaria	11700eu	15700eu		
1130	1200		Vatican City, Vatican Radio	15565me	17765me		
1130	1200		Vietnam, Voice of Vietnam	9840as	12020as		

1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1225		Saudi Arabia, BSKSA	15250af	
1200	1230		China, China Radio International	11780as	
1200	1230		France, Radio France International	13640af	
			17800af	21620af	
1200	1230		Germany, AWR-Europe	15435as	
1200	1230		Japan, NHK World Radio Japan	6120na	
			9625pa	9695as	9790eu
1200	1245		Australia, HCJB Global	15400as	
1200	1245		USA, WYFR/Family Radio Worldwide	5950na	

			5985na				
1200	1258		New Zealand, Radio NZ International	9655pa			
1200	1300		Anguilla, Worldwide Univ Network		11775am		
1200	1300		Australia, ABC NT Alice Springs		2310do		
1200	1300		Australia, ABC NT Katherine	2485do			
1200	1300		Australia, ABC NT Tennant Creek		2325do		
1200	1300		Australia, CVC International	13635as			
1200	1300	DRM	Australia, Radio Australia	5995va	12080pa		
1200	1300		Australia, Radio Australia	6020va	9475as		
			9560pa	9580va	9590va	11945as	
1200	1300	Sat/Sun	Canada, CBC NQ SW Service	9625na			
1200	1300		Canada, CFRX Toronto ON	6070na			
1200	1300		Canada, CFVP Calgary AB	6030na			
1200	1300		Canada, CKZN St John's NF	6160na			
1200	1300		Canada, CKZU Vancouver BC	6160na			
1200	1300		China, China Radio International		5955as		
			9460as	9600as	9645as	9730as	
			9760va	11650as	11660as	11690as	
			11760va	11980as	13645as	13650eu	
			17490eu				
1200	1300	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af			
1200	1300	DRM	Germany, Deutsche Welle	9545eu	13810eu		
1200	1300	Sun	Latvia, Radio SWH	9290eu			
1200	1300		Libya, Voice of Africa		17725af	21695af	
1200	1300		Malaysia, RTM/Traxx FM	7295do			
1200	1300		Nigeria, Radio Nigeria/Kaduna	4770do			
1200	1300		Nigeria, Voice of Nigeria/Lagos	9690af			
1200	1300		Palau, T8WH/World Harvest	9930as	12130as		
1200	1300		Papua New Guinea, Wantok R. Light	7325do			
1200	1300		Poland, Polish Radio	7330eu	9525eu		
1200	1300		Russia, Voice of Russia		7330as	12065as	
			15470as				
1200	1300		South Korea, KBS World Radio	9650na			
1200	1300	DRM	Taiwan, R Taiwan International	9850va			
1200	1300		UK, BBC World Service	5875as	6190af		
			6195as	9545eu	9740as	9860af	
			11750as	11760me	15310as	15575as	
			17640af	17790as	17830af	21470af	
1200	1300		USA, American Forces Network		4319usb		
			5446usb	5765usb	6350usb	7812usb	
			10320usb	12133usb	12759usb	13362usb	
1200	1300		USA, EWTN Vandiver AL	11530as			
1200	1300		USA, KNLS Anchor Point AK	7355as	9780as		
1200	1300		USA, Voice of America	6140va	7575va		
			9510va	9760va	12075va		
1200	1300		USA, WBOH Newport NC	5920am			
1200	1300		USA, WHRI Cypress Creek SC		7315va		
			7385va				
1200	1300		USA, WINB Red Lion PA	9265am			
1200	1300		USA, WRMI Miami FL	9955am			
1200	1300		USA, WTJC Newport NC	9370na			
1200	1300		USA, WWCR Nashville TN	7490na	9980na		
			13845na	15825na			
1200	1300		USA, WWRB Manchester TN	9385va			
1200	1300		USA, WYFR/Family Radio Worldwide		17555am		
			17795na				
1200	1300	vl	Zambia CVC/ The Voice Africa		6065af		
			13590af				
1230	1300		Bangladesh, Bangla Betar	7250as			
1230	1300		Thailand, Radio Thailand World Svc	9890va			
1230	1300		Turkey, Voice of Turkey	15420eu	15520as		
1230	1300		Vietnam, Voice of Vietnam	9840as	12020as		
1245	1300	smtwhf	Australia, HCJB Global	15400as			

1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1325		Turkey, Voice of Turkey	15450eu	15520as		
1300	1327		Czech Rep, Radio Prague	13580af	17540af		
1300	1330		Egypt, Radio Cairo	17835as			
1300	1357		North Korea, Voice of Korea	9335na	11710na		
			13760eu	15245eu			
1300	1400		Anguilla, Worldwide Univ Network		11775am		
1300	1400		Australia, ABC NT Alice Springs		2310do		
1300	1400		Australia, ABC NT Katherine	2485do			
1300	1400		Australia, CVC International	13635as			
1300	1400	DRM	Australia, Radio Australia	5995va	12080pa		
1300	1400		Australia, Radio Australia	6020va	9560as		
			9580va	9590va			
1300	1400	Sat/Sun	Canada, CBC NQ SW Service	9625na			
1300	1400		Canada, CFRX Toronto ON	6070na			
1300	1400		Canada, CFVP Calgary AB	6030na			
1300	1400		Canada, CKZN St John's NF	6160na			
1300	1400		Canada, CKZU Vancouver BC	6160na			
1300	1400		China, China Radio International		5955as		
			9570na	9650as	9730as	9760va	
			9870as	11660as	11980as	13610eu	
			13755as	13790eu	15260na		

1300	1400	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af	
1300	1400		Indonesia, Voice of Indonesia 9526va	11784al	
1300	1400		Libya, Voice of Africa	17725af	21695af
1300	1400		Malaysia, RTM/Traxx FM	7295do	
1300	1400		New Zealand, Radio NZ International	6170pa	
1300	1400		Nigeria, Radio Nigeria/Kaduna	4770do	
1300	1400		Nigeria, Voice of Nigeria/Lagos	9690af	
1300	1400		Palau, T8WH/World Harvest 9930as		
1300	1400		Papua New Guinea, Wantok R. Light	7325do	
1300	1400		Russia, Voice of Russia	7330as	12065as
1300	1400		South Korea, KBS World Radio	9570na	
			9770as		
1300	1400	DRM	UK, BBC World Service	9545eu	13810eu
1300	1400		UK, BBC World Service	5875as	6190af
			6195as	9545eu	9740as	9860af
			11760me	15310as	15420af	15575as
			17640af	17790as	17830af	21470af
1300	1400		USA, American Forces Network	4319usb	
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
1300	1400		USA, EWTN Vandiver AL	11530as	
1300	1400		USA, KJES Vado NM	11715na	
1300	1400		USA, Voice of America	7575va	9340va
			9510va	9760va		
1300	1400		USA, WBOH Newport NC	5920am	
1300	1400	Sat/Sun	USA, WHRA Greenbush ME	15195va	
1300	1400		USA, WHRI Cypress Creek SC	7315va	
1300	1400	Sat/Sun	USA, WHRI Cypress Creek SC	9840va	
1300	1400		USA, WINB Red Lion PA	9265va	
1300	1400		USA, WRMI Miami FL	9955am	
1300	1400		USA, WTJC Newport NC	9370na	
1300	1400		USA, WWCR Nashville TN	7490na	9980na
			13845na	15825na		
1300	1400		USA, WWRB Manchester TN	9385va	
1300	1400		USA, WYFR/Family Radio Worldwide	11830am	
			11865na	11910na	13810as	17795na
1300	1400	vl	Zambia CVC/ The Voice Africa	6065af	
			13590af			
1310	1340		Japan, NHK World Radio Japan	11985as	
1330	1357	fa/DRM	Czech Rep, Radio Prague	9850eu	
1330	1400	mtwhf	Guam, KSDA/ AWR	15275as	
1330	1400	ha	Guam, KSDA/ AWR	11880as	
1330	1400		India, All India Radio	9690as	11620as
			13710as			
1330	1400		Laos, Radio Nationale Lao	7145as	
1330	1400		Sweden, Radio Sweden	15735va	
1330	1400		Vietnam, Voice of Vietnam	9840as	12020as

1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1415	Sat	Germany, Pan American BC	15205me	
1400	1427		Czech Rep, Radio Prague	9955na	
1400	1430		Australia, Radio Australia	5995va	6080va
			7240va	9590va		
1400	1430		China, China Radio International	7325as	
1400	1430	Sun	Germany, Pan American BC	15205as	
1400	1430	`	Japan, NHK World Radio Japan	11705as	
			11985as	13630eu	21560af	
1400	1430		Thailand, Radio Thailand World Svc	9455va	
1400	1430	Sun	United Arab Emirates, FEBA	12025as	
1400	1457		Netherlands, R Netherlands Worldwide	5825as	
			7530as	9345as	11835as	15815as
1400	1500		Anguilla, Worldwide Univ Network	11775am	
1400	1500		Australia, ABC NT Alice Springs	2310do	
1400	1500		Australia, ABC NT Katherine 2485do		
1400	1500		Australia, ABC NT Tennant Creek	2325do	
1400	1500		Australia, CVC International	13635as	
1400	1500		Australia, HCJB Global	15425as	
1400	1500		Bhutan, Bhutan Broadcasting Svc	6035as	
1400	1500	Sat/Sun	Canada, CBC NQ SW Service 9625na		
1400	1500		Canada, CFRX Toronto ON 6070na		
1400	1500		Canada, CFVP Calgary AB 6030na		
1400	1500		Canada, CKZN St John's NF 6160na		
1400	1500		Canada, CKZU Vancouver BC 6160na		
1400	1500		China, China Radio International	5955as	
			9870as	11675as	11765as	13740na
			13710eu	13790eu		
1400	1500	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af	
1400	1500		Germany, CVC Intl-Christian Vision	17770af	
1400	1500		Germany, Overcomer Ministries	6110eu	
			13810va			
1400	1500		India, All India Radio	9690as	11620as
			13710as			
1400	1500		Libya, Voice of Africa	17725af	21695af
1400	1500		Malaysia, RTM/Traxx FM	7295do	
1400	1500		New Zealand, Radio NZ International	6170pa	
1400	1500		Nigeria, Radio Nigeria/Kaduna	4770do	

1400	1500		Nigeria, Voice of Nigeria/Lagos	9690af	
1400	1500		Oman, Radio Oman	15140as	
1400	1500		Palau, T8WH/World Harvest 9930as	9965as	
1400	1500		Papua New Guinea, Wantok R. Light	7325do	
1400	1500	DRM	Russia, Voice of Russia	9445as	9750eu
1400	1500		Russia, Voice of Russia	6045as	7330as
			9850as	15605as		
1400	1500		South Africa, Channel Africa	9625af	
1400	1500	DRM	UK, BBC World Service	9545eu	15780eu
1400	1500		UK, BBC World Service	5875as	6190af
			6195as	7230af	9545eu	9740as
			11920as	12095as	15310as	17640af
			17830af	21470af		
1400	1500	Sat/Sun	UK, Bible Voice Broadcasting	17805as	
1400	1500		USA, American Forces Network	4319usb	
			5446usb	5765usb	6350usb	7812usb
			10320usb	12133usb	12759usb	13362usb
1400	1500		USA, EWTN Vandiver AL	11530as	
1400	1500		USA, KJES Vado NM	11715na	
1400	1500		USA, KNLS Anchor Point AK	7355as	
1400	1500		USA, Voice of America	4930af	6080af
			7575va	9760va	11715va	13750af
			15580af	17585af		
1400	1500		USA, WBOH Newport NC	5920am	
1400	1500	Sat/Sun	USA, WHRA Greenbush ME	15195va	
1400	1500	Sat/Sun	USA, WHRI Cypress Creek SC	9840va	
1400	1500		USA, WINB Red Lion PA	13570am	
1400	1500		USA, WRMI Miami FL	9955am	
1400	1500		USA, WTJC Newport NC	9370na	
1400	1500		USA, WWCR Nashville TN	7490na	9980na
			13845na	15825na		
1400	1500		USA, WWRB Manchester TN	9385va	
1400	1500		USA, WYFR/Family Radio Worldwide	9365as	
			9615as	9865as	11725as	13810as
1400	1500	vl	Zambia CVC/ The Voice Africa	6065af	
			13590af			
1415	1430		Nepal, Radio Nepal	5005as	
1415	1450		Guam, KTWR/TWR	9975as	
1430	1445	Sun	Germany, Pan American BC	15205as	
1430	1445	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu	
1430	1500	mtwhfa	Albania, Radio Tirana	13625na	
1430	1500		Australia, Radio Australia	5995va	6080va
			7240va	9475as	9590va	11660pa
1430	1500		China, Central People's BS/CNR	6010do	
			7350do	9480do		
1430	1500		Ethiopia, Radio Ethiopia	5990af	7110af
			9704af			
1430	1500	DRM	South Korea, KBS World Radio	9660eu	
1430	1500		Sweden, Radio Sweden	13820va	

1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500	1510	mtwhfa	Turkmenistan, Turkmen Radio 5015eu		
1500	1530		Australia, HCJB Global	15425as	
1500	1530		China, China Radio International	9600as	
1500	1530		Guam, KSDA/ AWR	11720as	
1500	1530		Nigeria, Radio, National Svc/Abuja	7275do	
1500	1530		UK, BBC World Service	7385af	11860af
			15420af			
1500	1530	Sat	UK, Bible Voice Broadcasting 15295as		
1500	1530		UK, Sudan Radio Service	17745af	
1500	1530		Vietnam, Voice of Vietnam	7285va	9840va
			12020va			
1500	1545		USA, WYFR/Family Radio Worldwide	15770sa	
1500	1550		New Zealand, Radio NZ International	6170pa	
1500	1557		Libya, Voice of Africa	17725af	21695af
1500	1557		North Korea, Voice of Korea 9335na	11710na	
			13760eu	15245eu		
1500	1600		Anguilla, Worldwide Univ Network	11775am	
1500	1600		Australia, ABC NT Alice Springs	2310do	
1500	1600		Australia, ABC NT Katherine 2485do		
1500	1600		Australia, CVC International	11730as	
1500	1600		Australia, Radio Australia	5995va	6080va
			7240va	9475as	9590va	11660pa
1500	1600	Sat/Sun	Canada, CBC NQ SW Service 9625na		
1500	1600		Canada, CFRX Toronto ON 6070na		
1500	1600		Canada, CFVP Calgary AB 6030na		
1500	1600		Canada, CKZN St John's NF 6160na		
1500	1600		Canada, CKZU Vancouver BC 6160na		
1500	1600	DRM	Canada, R Canada International	9800na	
1500	1600		Canada, R Canada International	11675va	
			17720va			
1500	1600		China, China Radio International	5955as	
			6095as	7160as	7325as	7405as
			9720as	9800as	9870as	11965eu
			13640as	13740na		
1500	1600	Sat/Sun	Equatorial Guinea, Radio East Africa	15190af	

Start	End	Days	Station	Freq 1	Freq 2	Freq 3	Freq 4
1500	1600		Germany, CVC Intl-Christian Vision	17770af			
1500	1600		Germany, Overcomer Ministries	17485af			
1500	1600		Italy, NEXUS/IRRS	15650af			
1500	1600		Malaysia, RTM/Traxx FM	7295do			
1500	1600		Myanmar, Myanma Radio	5985as			
1500	1600		Nigeria, Radio Nigeria/Kaduna	4770do			
1500	1600		Nigeria, Voice of/Lagos	9690af			
1500	1600		Palau, T8WH/World Harvest	9965as			
1500	1600		Papua New Guinea, Wantok R. Light	7325do			
1500	1600		Russia, Voice of Russia	4975me	9625as		
				9660as	9735me	9850as	11985me
				12040eu	15605as		
1500	1600		Rwanda, Radio Rwanda	6055do			
1500	1600		South Africa, Channel Africa	9625af			
1500	1600		Uganda, Dunamis Shortwave	4750af			
1500	1600	DRM	UK, BBC World Service	5790eu	15780eu		
1500	1600		UK, BBC World Service	5875as	5975as		
				6190af	6195as	7230af	7385af
				9740as	11920as	12095eu	15310af
				15400af	17640af	17830af	21470af
1500	1600		USA, American Forces Network	4319usb			
				5446usb	5765usb	6350usb	7812usb
				10320usb	12133usb	12759usb	13362usb
1500	1600		USA, EWTN Vandiver AL	15610eu			
1500	1600		USA, Voice of America	4930af	6080af		
				7545va	7575va	9700va	12005va
				12150va	13750va	15530va	17740va
				17895af		15580af	17895af
1500	1600		USA, Voice of America/Special English	6160va			
				7520va	9485va	9760va	15550va
1500	1600		USA, WBOH Newport NC	5920am			
1500	1600	Sat/Sun	USA, WHRA Greenbush ME	15195va			
1500	1600	Sat/Sun	USA, WHRI Cypress Creek SC	9840va			
				11785va			
1500	1600		USA, WINB Red Lion PA	13570am			
1500	1600		USA, WRMI Miami FL	9955am			
1500	1600		USA, WTJC Newport NC	9370na			
1500	1600		USA, WWCR Nashville TN	7490na	9980na		
				13845na	15825na		
1500	1600		USA, WWRB Manchester TN	9385va			
1500	1600		USA, WYFR/Family Radio Worldwide	11830am			
				11910na	17795na		
1500	1600	vl	Zambia CVC/ The Voice Africa	6065af			
				13590af			
1505	1600		Canada, R Canada International	9515na			
1515	1530	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu			
1530	1545		India, All India Radio	7255as	9820as		
				9910as			
1530	1550		Vatican City, Vatican Radio	13765as	15235as		
1530	1600		Germany, AWR-Europe	15335as			
1530	1600		Iran, VOIRI/ IRIB	7305as	9600as	9635as	
1530	1600		Mongolia, Voice of Mongolia	9665as	12085as		
1530	1600		Sweden, Radio Sweden	13600va			
1530	1600	Sat	UK, BBC World Service	7385af	15420af		
1530	1600	Sun	UK, Bible Voice Broadcasting	13590me			
1530	1600	Sat	UK, Bible Voice Broadcasting	15680as			
1545	1600	mtwhfa	UK, Bible Voice Broadcasting	13590me			
1551	1600	DRM	New Zealand, Radio NZ International	6170pa			
1551	1600		New Zealand, Radio NZ International	7285pa			

1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

Start	End	Days	Station	Freq 1	Freq 2	Freq 3	Freq 4
1600	1605	Sun	Croatia, Voice of Croatia	6165eu			
1600	1615	mtwhfa	Croatia, Voice of Croatia	6165eu			
1600	1615	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu			
1600	1615		Pakistan, Radio Pakistan	9385va	11565va		
				15100as			
1600	1615		UK, Bible Voice Broadcasting	13590me			
1600	1620	t	UK, Bible Voice Broadcasting	13590me			
1600	1627		Czech Rep, Radio Prague	5930eu	17845na		
1600	1627		Iran, VOIRI/ IRIB	7305as	9600as		
1600	1630		Guam, KSDA/ AWR	11720as	11805as		
1600	1630		Myanmar, Myanma Radio	9730do			
1600	1630		Nigeria, Voice of Nigeria/Lagos	9690af			
1600	1630		Vietnam, Voice of Vietnam	7220va	7280va		
				9550va	9730va		
1600	1630		Yemen, Rep of Yemen Radio	9780me			
1600	1645		USA, WYFR/Family Radio Worldwide	11830am			
				11865na			
1600	1657		North Korea, Voice of Korea	9990va	11545va		
1600	1700		Anguilla, Worldwide Univ Network	11775am			
1600	1700		Australia, ABC NT Alice Springs	2310do			
1600	1700		Australia, ABC NT Katherine	2485do			
1600	1700		Australia, CVC International	9680as			
1600	1700		Australia, Radio Australia	5995va	6080va		
				7240as	9475va	9580va	9710as

Start	End	Days	Station	Freq 1	Freq 2	Freq 3	Freq 4
				11660pa			
1600	1700	Sat	Canada, CBC NQ SW Service	9625na			
1600	1700		Canada, CFRX Toronto ON	6070na			
1600	1700		Canada, CFVP Calgary AB	6030na			
1600	1700		Canada, CKZN St John's NF	6160na			
1600	1700		Canada, CKZU Vancouver BC	6160na			
1600	1700	DRM	Canada, R Canada International	9800am			
1600	1700		Canada, R Canada International	9515na			
1600	1700		China, China Radio International	6095af			
				6180as	7235as	7420af	9570af
				9720af	9760as	11650eu	11900af
				11940eu	11965eu	13760eu	
1600	1700		Egypt, Radio Cairo	12170af			
1600	1700		Ethiopia, Radio Ethiopia	7165af	9560af		
1600	1700		France, Radio France International	15605af			
				17605af			
1600	1700		Germany, CVC Intl-Christian Vision	17770af			
1600	1700		Germany, Deutsche Welle	6170as	9485as		
				9540as	15640as		
1600	1700		Italy, NEXUS/IRRS	15650af			
1600	1700		Malaysia, RTM/Traxx FM	7295do			
1600	1700	DRM	New Zealand, Radio NZ International	6170pa			
1600	1700		New Zealand, Radio NZ International	7285pa			
1600	1700		Nigeria, Radio Nigeria/Kaduna	4770do			
1600	1700		Palau, T8WH/World Harvest	9965as			
1600	1700		Papua New Guinea, Wantok R. Light	7325do			
1600	1700		Russia, Voice of Russia	4975me	11985va		
				12040af	13855af		
1600	1700		Rwanda, Radio Rwanda	6055do			
1600	1700		South Korea, KBS World Radio	9515eu			
1600	1700		Taiwan, R Taiwan International	11550as			
				13840as			
1600	1700		Uganda, Dunamis Shortwave	4750af			
1600	1700	DRM	UK, BBC World Service	5790eu	11810eu		
1600	1700		UK, BBC World Service	3255af	5790eu		
				5975as	6190af	7385af	9625as
				11920as	12095eu	15400af	17640af
				17795af	17830af	21470af	
1600	1700	Sat	UK, BBC World Service	7385af	15420af		
1600	1700	Sun	UK, Bible Voice Broadcasting	13590me			
1600	1700		USA, American Forces Network	4319usb			
				5446usb	5765usb	6350usb	7812usb
				10320usb	12133usb	12759usb	13362usb
1600	1700		USA, EWTN Vandiver AL	15610eu			
1600	1700		USA, Voice of America	4930af	6080af		
				9885af	15580af	17715af	
1600	1700		USA, Voice of America/Special English	12080va			
				13570va	17895va		
1600	1700		USA, WBOH Newport NC	5920am			
1600	1700		USA, WHRA Greenbush ME	17520af			
1600	1700		USA, WHRI Cypress Creek SC	9840va			
				11785va			
1600	1700		USA, WINB Red Lion PA	13570am			
1600	1700		USA, WRMI Miami FL	9955ca			
1600	1700		USA, WTJC Newport NC	9370na			
1600	1700		USA, WWCR Nashville TN	9980na	12160na		
				13845na	15825na		
1600	1700		USA, WWRB Manchester TN	9385va			
1600	1700		USA, WYFR/Family Radio Worldwide	6085sa			
				13695as	17795na	18980af	21455eu
				21525af			
1600	1700	vl	Zambia CVC/ The Voice Africa	4965af			
				13590af			
1615	1630		Vatican City, Vatican Radio	4005eu	5885eu		
				7250eu	9645eu	15595me	
1615	1700	Sun	UK, BBC World Service	7385af	11860af		
				15420af			
1630	1645		UK, Bible Voice Broadcasting	13590me			
1630	1657		Slovakia, R Slovakia International	5920eu			
				6055eu			
1630	1700		Guam, KSDA/ AWR	6190as			
1630	1700		Nigeria, Voice of Nigeria/Lagos	15120af			
1630	1700	mtwhf	UK, BBC World Service	15420af			
1630	1700	Sat	UK, BBC World Service	11860af			
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio	4930eu			
1645	1700	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	7370eu			
1645	1700		Tajikistan, Tajik Radio	7245as			

1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

Start	End	Days	Station	Freq 1	Freq 2
1700	1705	DRM	Canada, R Canada International	9800am	
1700	1727		Czech Rep, Radio Prague	5930eu	17485eu
1700	1730		Australia, CVC International	9680as	
1700	1730	DRM	Romania, R Romania International	7460eu	
1700	1730		USA, Voice of America	6080af	9885af
				11835af	15580af
1700	1730		Vietnam, Voice of Vietnam	9725pa	

Start	Stop	Days	Station	Frequencies
1700	1746		UK, BBC World Service	6005af 9410af
1700	1750	DRM	New Zealand, Radio NZ International	6170pa
1700	1750		New Zealand, Radio NZ International	7285pa
1700	1756		Romania, R Romania International	9535eu 11735eu
1700	1759	DRM	Poland, Polish Radio	7265eu
1700	1759		Poland, Polish Radio	9790eu
1700	1800		Anguilla, Worldwide Univ Network	11775am
1700	1800		Australia, ABC NT Alice Springs	2310do
1700	1800		Australia, ABC NT Katherine	2485do
1700	1800		Australia, Radio Australia	5995va 6080va 9475as 9580va 9710as 11880as
1700	1800	Sat	Canada, CBC NQ SW Service	9625na
1700	1800		Canada, CFRX Toronto ON	6070na
1700	1800		Canada, CFVP Calgary AB	6030na
1700	1800		Canada, CKZN St John's NF	6160na
1700	1800		Canada, CKZU Vancouver BC	6160na
1700	1800		Canada, R Canada International	9515va
1700	1800	Sat/Sun	Canada, R Canada International	5850va
1700	1800		China, China Radio International	6060as 6090as 6140as 6145eu 6165eu 7235as 7265as 7315va 7335eu 7410as 7420as 9570af 9695eu 11900af 11940eu 13760eu
1700	1800		Egypt, Radio Cairo	12170af
1700	1800		Equatorial Guinea, Radio Africa	7190af 15190af
1700	1800		Germany, CVC Intl-Christian Vision	17770af
1700	1800	DRM	Germany, Deutsche Welle	5790eu 9960eu
1700	1800		Italy, NEXUS/IRRS	15650af
1700	1800		Malaysia, RTM/Traxx FM	7295do
1700	1800		Nigeria, Radio Nigeria/Kaduna	4770do
1700	1800		Nigeria, Voice of Nigeria/Lagos	15120af
1700	1800		Palau, T8WH/World Harvest	9965as
1700	1800		Papua New Guinea, Wantok R. Light	7325do
1700	1800	DRM	Romania, R Romania International	9535eu
1700	1800		Russia, Voice of Russia	4975me 11610me 11985af 12040af 12070af 13855af
1700	1800		Rwanda, Radio Rwanda	6055do
1700	1800		South Africa, Channel Africa	15235af
1700	1800		Taiwan, R Taiwan International	15690af
1700	1800		Uganda, Dunamis Shortwave	4750af
1700	1800		Uganda, UBC Radio	4976do
1700	1800		UK, BBC World Service	3255af 5790eu 5875eu 5975as 6190af 7400as 7405af 9625as 9960eu 12095af 13675eu 15400af 17795af 17830af
1700	1800	smtwhf	UK, Bible Voice Broadcasting	13590me
1700	1800	Sat	UK, Bible Voice Broadcasting	9430me
1700	1800		USA, American Forces Network	4319usb 5446usb 5765usb 6350usb 7812usb 10320usb 12133usb 12759usb 13362usb
1700	1800		USA, EWTN Vandiver AL	15610na
1700	1800	Sat/Sun	USA, Voice of America	15675af
1700	1800		USA, WBCQ Monticello ME	15420am
1700	1800		USA, WBOH Newport NC	5920am
1700	1800		USA, WHRA Greenbush ME	17520af
1700	1800		USA, WHRI Cypress Creek SC	11785va
1700	1800	smtwhf	USA, WHRI Cypress Creek SC	9840va
1700	1800	Sat	USA, WHRI Cypress Creek SC	9495va
1700	1800		USA, WINB Red Lion PA	13570am
1700	1800		USA, WRMI Miami FL	9955ca
1700	1800		USA, WTJC Newport NC	9370na
1700	1800		USA, WWCR Nashville TN	9980na 12160na 13845na 15825na
1700	1800		USA, WWRB Manchester TN	9385va
1700	1800		USA, WYFR/Family Radio Worldwide	13690na 17795na 18980af 21455eu
1700	1800	vl	Zambia CVC/ The Voice Africa	4965af 13590af
1720	1740	fas	USA, Voice of America	4930va 11605va 15775va
1730	1800	DRM	Bulgaria, Radio Bulgaria	9400eu
1730	1800		Bulgaria, Radio Bulgaria	5900eu 7400eu
1730	1800		Liberia, ELWA	4760do 6070al
1730	1800	mtwhf	UK, Sudan Radio Service	9840af
1730	1800		USA, Voice of America	6080af 9885af 15580af 17895af
1730	1800	mtwh	USA, Voice of America	4930va 11605va 15775va
1730	1800		Vatican City, Vatican Radio	11625af 13765af 15570af
1745	1800		Bangladesh, Bangla Betar	7250as
1745	1800	DRM	India, All India Radio	9950eu
1745	1800		India, All India Radio	7410eu 9445af 11620eu 11935af 13605as 15155af 17670af
1750	1800	DRM	New Zealand, Radio NZ International	7285pa
1750	1800		New Zealand, Radio NZ International	6170pa

1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

Start	Stop	Days	Station	Frequencies
1800	1815	Sat	UK, Bible Voice Broadcasting	11970as
1800	1815	Sun	UK, Bible Voice Broadcasting	13590me
1800	1830		China, China Radio International	6020eu 7265eu
1800	1830		Nigeria, Radio, National Svc/Abuja	7275do
1800	1830		South Africa, AWR Africa	3215af 3345af 9610af
1800	1830		UK, BBC World Service	5975as 6015as 9625as
1800	1830	Sat	UK, Bible Voice Broadcasting	9430me
1800	1830		USA, Voice of America	6080af 9885af 15580af 17895af
1800	1830	Sat/Sun	USA, Voice of America	4930af
1800	1850	DRM	New Zealand, Radio NZ International	7285pa
1800	1850		New Zealand, Radio NZ International	6170pa
1800	1857		Netherlands, R Netherlands Worldwide	6020af 15535af
1800	1857		North Korea, Voice of Korea	13760eu 15245eu
1800	1900		Anguilla, Worldwide Univ Network	11775am
1800	1900	mtwhf	Argentina, Radio Nacional RAE	9690eu 15345eu
1800	1900		Australia, ABC NT Alice Springs	2310do
1800	1900		Australia, ABC NT Katherine	2485do
1800	1900		Australia, Radio Australia	6080va 7240as 9475va 9580va 9710as 11880as
1800	1900		Bangladesh, Bangla Betar	7250eu
1800	1900		Canada, CFRX Toronto ON	6070na
1800	1900		Canada, CFVP Calgary AB	6030na
1800	1900		Canada, CKZN St John's NF	6160na
1800	1900		Canada, CKZU Vancouver BC	6160na
1800	1900		Canada, R Canada International	9530af 11765af 17735af 17810af
1800	1900		China, China Radio International	6030eu 9600eu 13760eu
1800	1900		Equatorial Guinea, Radio Africa	7190af 15190af
1800	1900		Germany, CVC Intl-Christian Vision	17770af
1800	1900	DRM	Germany, Deutsche Welle	5790eu 9960eu
1800	1900	DRM	India, All India Radio	9950eu
1800	1900		India, All India Radio	7410eu 9445af 11620eu 11935af 13605as 15155af 17670af
1800	1900	fas	Italy, NEXUS/IRRS	7290va
1800	1900		Kuwait, Radio Kuwait	11990va
1800	1900		Liberia, ELWA	4760do 6070al
1800	1900		Malaysia, RTM/Traxx FM	7295do
1800	1900		Nigeria, Radio Nigeria/Kaduna	4770do
1800	1900		Nigeria, Voice of Nigeria/Lagos	15120af
1800	1900		Palau, T8WH/World Harvest	9965as
1800	1900		Papua New Guinea, Wantok R. Light	7325do
1800	1900		Russia, Voice of Russia	4975me 12040af 12070af
1800	1900		Rwanda, Radio Rwanda	6055do
1800	1900		South Korea, KBS World Radio	7275eu
1800	1900		Taiwan, R Taiwan International	6155eu
1800	1900		Uganda, Dunamis Shortwave	4750af
1800	1900		Uganda, UBC Radio	4976do
1800	1900		UK, BBC World Service	3255af 5790eu 5875eu 5995as 6190af 7405af 9485as 9660eu 11810af 12095af 13675eu 15400af 17795af
1800	1900	Sun	UK, Bible Voice Broadcasting	6130va
1800	1900		USA, American Forces Network	4319usb 5446usb 5765usb 6350usb 7812usb 10320usb 12133usb 12759usb 13362usb
1800	1900		USA, EWTN Vandiver AL	15610na
1800	1900		USA, KJES Vado NM	15385na
1800	1900		USA, WBCQ Monticello ME	15420am
1800	1900		USA, WBOH Newport NC	5920am
1800	1900		USA, WHRA Greenbush ME	17520af
1800	1900		USA, WHRI Cypress Creek SC	9840va 11785va
1800	1900		USA, WINB Red Lion PA	13570am
1800	1900		USA, WRMI Miami FL	9955ca
1800	1900		USA, WTJC Newport NC	9370na
1800	1900		USA, WWCR Nashville TN	9980na 12160na 13845na 15825na
1800	1900		USA, WWRB Manchester TN	9385va
1800	1900		USA, WYFR/Family Radio Worldwide	5910eu 6180af 7430eu 9405af 9465af 9505af 9770af 11875af 13830af 17795af 17845af 18930af 18940af
1800	1900		Yemen, Rep of Yemen Radio	9780me

1800	1900	vl	Zambia CVC/ The Voice Africa		4965af		
			13590af				
1805	1810	Sat	Croatia, Voice of Croatia	6165eu			
1805	1815	mtwhf	Croatia, Voice of Croatia	6165eu			
1810	1820	f	USA, Voice of America	4930va	11605va		
			15775va				
1830	1857		Slovakia, R Slovakia International		5920eu		
			6055eu				
1830	1858		Serbia, International Radio of Serbia		6100eu		
1830	1900		Turkey, Voice of Turkey	9785eu			
1830	1900		UK, BBC World Service	6005af	9410af		
1830	1900	f	UK, Bible Voice Broadcasting	9430me			
1830	1900		USA, Voice of America	4930af	6080af		
			9885af	15580af	17895af		
1845	1900	mtwhfa	Albania, Radio Tirana	7435eu	13640na		
1851	1900	DRM	New Zealand, Radio NZ International		9890pa		

1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1905		Canada, R Canada International		9515va		
1900	1925		Turkey, Voice of Turkey	9785eu			
1900	1930		Germany, Deutsche Welle	6150af	11795af		
			13650af	17860af			
1900	1930		Vietnam, Voice of Vietnam	7280va	9730va		
1900	1935	DRM	New Zealand, Radio NZ International		9890pa		
1900	1945	DRM	India, All India Radio	9950eu			
1900	1945		India, All India Radio	7410eu	9445af		
			11620eu	11935af	13605as	15155af	
			17670af				
1900	1945		USA, WYFR/Family Radio Worldwide		6085sa		
1900	1950		New Zealand, Radio NZ International		9615pa		
1900	1957		Netherlands, R Netherlands Worldwide		9480af		
			11660eu	15335af			
1900	1957		North Korea, Voice of Korea	7100af	9975va		
			11910af	11535va			
1900	2000		Anguilla, Worldwide Univ Network		11775am		
1900	2000		Australia, ABC NT Alice Springs		2310do		
1900	2000		Australia, ABC NT Katherine	2485do			
1900	2000		Australia, Radio Australia	6080va	7240as		
			9500va	9580va	9710as	11880as	
1900	2000		Canada, CFRX Toronto ON	6070na			
1900	2000		Canada, CFVP Calgary AB	6030na			
1900	2000		Canada, CKZN St John's NF	6160na			
1900	2000		Canada, CKZU Vancouver BC	6160na			
1900	2000		China, China Radio International		7285eu		
			7295va	9435va	9440va		
1900	2000		Egypt, Radio Cairo	11510af			
1900	2000		Equatorial Guinea, Radio Africa		7190af		
			15190af				
1900	2000		Germany, CVC Intl-Christian Vision		17770af		
1900	2000	DRM	Germany, Deutsche Welle	3995eu	5875eu		
1900	2000		Germany, Overcomer Ministries		3975eu		
1900	2000	fas	Italy, NEXUS/IRRS	7290va			
1900	2000		Kuwait, Radio Kuwait		11990va		
1900	2000		Liberia, ELWA	4760do	6070al		
1900	2000		Malaysia, RTM/Traxx FM	7295do			
1900	2000		Nigeria, Radio Nigeria/Kaduna		4770do		
1900	2000		Nigeria, Voice of Nigeria/Lagos		15120af		
1900	2000		Palau, T8WH/World Harvest	9965as			
1900	2000		Papua New Guinea, Wantok R. Light		7325do		
1900	2000		Russia, Voice of Russia	12040af	12070af		
1900	2000		Rwanda, Radio Rwanda	6055do			
1900	2000	mtwhf	Spain, Radio Exterior de Espana		9665eu		
			11620eu				
1900	2000		Swaziland, TWR	3200af			
1900	2000		Thailand, Radio Thailand World Svc		7570eu		
1900	2000		Uganda, UBC Radio	4976do			
1900	2000		UK, BBC World Service	3255af	3995eu		
			5875eu	5995as	6005af	6155as	
			6190af	9410af	11810af	12095af	
			15400af	17795af			
1900	2000	Sun	UK, Bible Voice Broadcasting	11830af			
1900	2000		Ukraine, R Ukraine International		7490eu		
1900	2000		USA, American Forces Network		4319usb		
			5446usb	5765usb	6350usb	7812usb	
			10320usb	12133usb	12759usb	13362usb	
1900	2000		USA, EWTN Vandiver AL		15610na		
1900	2000		USA, Voice of America	4930af	4940af		
			6120af	9885af	15580af	17895af	
1900	2000		USA, Voice of America/Special English		7480va		
			9780va				
1900	2000	smtwhf	USA, WBCQ Monticello ME	7415am			
1900	2000		USA, WBOH Newport NC	5920am			
1900	2000	twhfas	USA, WHRA Greenbush ME	9840af			
1900	2000		USA, WHRI Cypress Creek SC		11785va		
1900	2000		USA, WINB Red Lion PA	13570am			
1900	2000		USA, WRMI Miami FL	9955ca			

1900	2000		USA, WTJC Newport NC	9370na			
1900	2000		USA, WWCR Nashville TN	9980na	12160na		
			13845na	15845na			
1900	2000		USA, WWRB Manchester TN	9385va			
1900	2000		USA, WYFR/Family Radio Worldwide		3230af		
			11855as	13615am	13690af	17795na	
			17845af	18930eu	18980eu		
1900	2000	vl	Zambia CVC/ The Voice Africa		4965af		
			5940af				
1905	2000	Mon	South Africa, SA Radio League		3215af		
1930	2000	Sat/Sun	Germany, Pan American BC	9515va			
1930	2000		Iran, VOIRI/ IRIB	5940eu	6205eu	7205eu	
			9800af	9925af			
1930	2000		South Africa, RTE Radio One	6225af			
1936	1950	DRM	New Zealand, Radio NZ International		9890pa		
1945	2000	mtwhf	UK, Bible Voice Broadcasting	11830af			
1945	2000	DRM	Vatican City, Vatican Radio		9800na		
1950	2000		New Zealand, Radio NZ International		11725pa		
1951	2000	DRM	New Zealand, Radio NZ International		9890pa		

2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2005	Mon	South Africa, SA Radio League		3215af		
2000	2015	Sat/Sun	Germany, Pan American BC	9515va			
2000	2015	mtwhf	UK, Bible Voice Broadcasting	11830af			
2000	2027		Czech Rep, Radio Prague	5930eu	11600na		
2000	2028		Iran, VOIRI/ IRIB	5940eu	6205eu	7205eu	
			9800af	9925af			
2000	2030	mtwhfa	Albania, Radio Tirana	7465eu	13640na		
2000	2030		Egypt, Radio Cairo	11510af			
2000	2030	Sat	Germany, Pan American BC	9515va			
2000	2030		South Africa, RTE Radio One	6225af			
2000	2030		USA, Voice of America	4930af	4940af		
			6080af	9885af	15580af	17895af	
2000	2030	DRM	Vatican City, Vatican Radio		9800na		
2000	2030		Vatican City, Vatican Radio	7365af	9755af		
			11625af				
2000	2045		USA, WYFR/Family Radio Worldwide		17750sa		
2000	2050	DRM	New Zealand, Radio NZ International		9890pa		
2000	2050		New Zealand, Radio NZ International		11725pa		
2000	2057		Netherlands, R Netherlands Worldwide		5905af		
			7425af	11610af			
2000	2100		Anguilla, Worldwide Univ Network		11775am		
2000	2100		Australia, ABC NT Alice Springs		2310do		
2000	2100		Australia, ABC NT Katherine	2485do			
2000	2100		Australia, ABC NT Tennant Creek		2325do		
2000	2100	Sat/Sun	Australia, Radio Australia	6080va	7240va		
			12080as				
2000	2100		Australia, Radio Australia	9500va	11650as		
			11660pa	11880as			
2000	2100		Belarus, Radio Belarus	7210eu	7255as		
			7390eu				
2000	2100		Canada, CFRX Toronto ON	6070na			
2000	2100		Canada, CFVP Calgary AB	6030na			
2000	2100		Canada, CKZN St John's NF	6160na			
2000	2100		Canada, CKZU Vancouver BC	6160na			
2000	2100		Canada, R Canada International		15235va		
			17735va				
2000	2100		China, China Radio International		5960eu		
			5985af	7275va	7285eu	7415eu	
			9600eu	11640af	13630af		
2000	2100		Equatorial Guinea, Radio Africa		7190af		
			15190af				
2000	2100		Germany, CVC Intl-Christian Vision		17770af		
2000	2100		Germany, Deutsche Welle	6150af	11795af		
			11865af	13650af			
2000	2100		Kuwait, Radio Kuwait		11990va		
2000	2100		Malaysia, RTM/Traxx FM	7295do			
2000	2100		Nigeria, Radio Nigeria/Kaduna		4770do		
2000	2100		Nigeria, Voice of Nigeria/Lagos		15120af		
2000	2100		Palau, T8WH/World Harvest	9965as			
2000	2100		Papua New Guinea, R East New Britain		3385do		
2000	2100		Papua New Guinea, Wantok R. Light		7325do		
2000	2100		Russia, Voice of Russia	12040af	12070af		
2000	2100		Rwanda, Radio Rwanda	6055do			
2000	2100		Swaziland, TWR	3200af	9500af		
2000	2100		Uganda, UBC Radio	4976do			
2000	2100	DRM	UK, BBC World Service	3995eu	5875eu		
2000	2100		UK, BBC World Service	3255af	3995eu		
			5875eu	6005af	6190af	9410af	
			11810af	12095af	13820af	15400af	
2000	2100		USA, American Forces Network		4319usb		
			5446usb	5765usb	6350usb	7812usb	
			10320usb	12133usb	12759usb	13362usb	
2000	2100		USA, EWTN Vandiver AL		15610me		
2000	2100		USA, WBCQ Monticello ME	7415am			
2000	2100		USA, WBOH Newport NC	5920am			

2000	2100		USA, WHRA Greenbush ME	15665af			
2000	2100	mtwhf	USA, WHRI Cypress Creek SC		7520va		
2000	2100	Sun	USA, WHRI Cypress Creek SC		9495va		
2000	2100		USA, WHRI Cypress Creek SC		11785va		
			15665na				
2000	2100		USA, WINB Red Lion PA	13570am			
2000	2100		USA, WRMI Miami FL	9955ca			
2000	2100		USA, WTJC Newport NC	9370na			
2000	2100		USA, WWCR Nashville TN	9980na	12160na		
			13845na	15825na			
2000	2100		USA, WWRB Manchester TN	9385va			
2000	2100		USA, WYFR/Family Radio Worldwide		13615am		
			17725sa	17795na	17845af	18980eu	
2000	2100	vl	Zambia CVC/ The Voice Africa		4965af		
			5940af				
2000	2105		Uganda, UBC Radio	4976do			
2030	2045		Thailand, Radio Thailand World Svc	9680eu			
2030	2056		Romania, R Romania International		9690na		
			9765eu	11810eu	11940af		
2030	2100		Cuba, Radio Havana Cuba	11760va	17660va		
2030	2100		Sweden, Radio Sweden	7395va			
2030	2100		Turkey, Voice of Turkey	7205va			
2030	2100		USA, Voice of America	4930af	6080af		
			7555va	9885af	15580af	17895af	
2030	2100		Vietnam, Voice of Vietnam	7220va	7280va		
			9550va	9730va			
2045	2100		India, All India Radio	7410eu	9445eu		
			9910pa	9950eu	11620va	11715pa	
2051	2100		New Zealand, Radio NZ International		13730pa		
2051	2200	DRM	New Zealand, Radio NZ International		15720pa		

2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

2100	2125		Turkey, Voice of Turkey	7205va			
2100	2128		Serbia, International Radio of Serbia	6100eu			
2100	2130		Australia, ABC NT Alice Springs	2310do			
2100	2130		Australia, ABC NT Katherine	2485do			
2100	2130		Australia, ABC NT Tennant Creek	2325do			
2100	2130		Austria, AWR-Europe	11955af			
2100	2130	Sat	Canada, CBC NQ SW Service	9625na			
2100	2130		China, China Radio International		6135eu		
			7225eu	7415eu	9490eu	9600eu	
			11640af	13630af			
2100	2130		Cuba, Radio Havana Cuba	17600va	17660va		
2100	2130		Nigeria, Radio, National Svc/Abuja	7275do			
2100	2130		South Korea, KBS World Radio	3955eu			
2100	2145		USA, WYFR/Family Radio Worldwide		13615am		
			13690af	17795na	18980af		
2100	2157		North Korea, Voice of Korea	13760eu	15245eu		
2100	2200		Angola, Radio Nacional de Angola	7217do			
2100	2200		Anguilla, Worldwide Univ Network	11775am			
2100	2200		Australia, Radio Australia	9500as	9660as		
			11650pa	11660pa	11695as	12080as	
			13630as	15515as			
2100	2200		Belarus, Radio Belarus	7210eu	7255as		
			7390eu				
2100	2200		Bulgaria, Radio Bulgaria	5900eu	7400eu		
2100	2200		Canada, CFRX Toronto ON	6070na			
2100	2200		Canada, CFVP Calgary AB	6030na			
2100	2200		Canada, CKZN St John's NF	6160na			
2100	2200		Canada, CKZU Vancouver BC	6160na			
2100	2200	DRM	Canada, R Canada International		9800na		
2100	2200		China, China Radio International		5990eu		
			7205af	7285eu	7325af		
2100	2200		Equatorial Guinea, Radio Africa		7190af		
			15190af				
2100	2200		Germany, Deutsche Welle	9735af	11865af		
			15205af				
2100	2200		Germany, Overcomer Ministries	6175eu			
2100	2200		Guyana, Voice of Guyana	3291do			
2100	2200		India, All India Radio	7410eu	9445eu		
			9910pa	9950eu	11620va	11715pa	
2100	2200		Liberia, ELWA	4760do	6070al		
2100	2200		Malaysia, RTM/Traxx FM	7295do			
2100	2200		New Zealand, Radio NZ International		13730pa		
2100	2200		Nigeria, Radio Nigeria/Kaduna	4770do			
2100	2200		Nigeria, Voice of Nigeria/Lagos	7255af			
2100	2200		Palau, T8WH/World Harvest	9965as			
2100	2200		Papua New Guinea, Wantok R. Light	7325do			
2100	2200		Russia, Voice of Russia	12040af	12070af		
2100	2200	Sat/Sun	Spain, Radio Exterior de Espana		9650eu		
2100	2200		Swaziland, TWR 3200af				
2100	2200		Syria, Radio Damascus	9330eu	12085as		
2100	2200	DRM	UK, BBC World Service	3995eu	5790eu		
2100	2200		UK, BBC World Service	3255af	3915as		
			5790eu	5905as	5965as	6005af	
			6190af	6195as	7410af	9915af	
			12095af				

2100	2200		Ukraine, R Ukraine International		5840eu		
2100	2200		USA, American Forces Network		4319usb		
			5446usb	5765usb	6350usb	7812usb	
			10320usb	12133usb	12759usb	13362usb	
2100	2200		USA, EWTN Vandiver AL	15610me			
2100	2200		USA, Voice of America	6080af	7555va		
			15580af				
2100	2200		USA, WBCQ Monticello ME	7415am			
2100	2200		USA, WBOH Newport NC	5920am			
2100	2200		USA, WHRA Greenbush ME	15665af			
2100	2200		USA, WHRI Cypress Creek SC		11785va		
			11885na				
2100	2200	mtwhfa	USA, WHRI Cypress Creek SC		15665na		
2100	2200	Sun	USA, WHRI Cypress Creek SC		9690na		
2100	2200		USA, WINB Red Lion PA	9265eu			
2100	2200		USA, WRMI Miami FL	9955ca			
2100	2200		USA, WTJC Newport NC	9370na			
2100	2200		USA, WWCR Nashville TN	7465na	9980na		
			12160na	13845na			
2100	2200		USA, WWRB Manchester TN	9385va			
2100	2200		USA, WYFR/Family Radio Worldwide		7430eu		
			12055af	17845na			
2100	2200	vl	Zambia CVC/ The Voice Africa		4965af		
			5940af				
2115	2200		Egypt, Radio Cairo	6255eu			
2130	2157		Czech Rep, Radio Prague	9410na	11600na		
2130	2200		Australia, ABC NT Alice Springs		4835do		
2130	2200		Australia, ABC NT Katherine	5025do			
2130	2200	mtwhfa	Canada, CBC NQ SW Service	9625na			
2130	2200		China, China Radio International		6135eu		
			7225eu	7325eu	7365eu	7415eu	
			9600eu				
2130	2200		Guam, KSDA/ AWR	11850as			
2130	2200		Sweden, Radio Sweden	7395va			
2130	2228		Lithuania, Mighty KBC Radio	6055eu			

2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2220		Japan, NHK World Radio Japan		13640pa		
2200	2230		Australia, HCJB Global	15525as			
2200	2230		India, All India Radio	7410eu	9445eu		
			9910pa	9950eu	11620va	11715pa	
2200	2230	Sat/Sun	Liberia, ELWA	4760do	6070al		
2200	2230		Swaziland, TWR 3200af				
2200	2235	DRM	New Zealand, Radio NZ International		15720pa		
2200	2235		New Zealand, Radio NZ International		13730pa		
2200	2245		Egypt, Radio Cairo	6255eu			
2200	2245		USA, WYFR/Family Radio Worldwide		15770af		
			17845va				
2200	2255		Turkey, Voice of Turkey	9830va			
2200	2256		Romania, R Romania International		7440eu		
			9675eu	9790af	11940af		
2200	2300		Anguilla, Worldwide Univ Network	6090am			
2200	2300		Australia, ABC NT Alice Springs		4835do		
2200	2300		Australia, ABC NT Katherine	5025do			
2200	2300		Australia, Radio Australia	12010va	13630pa		
			15230va	15240pa	15515as	15560pa	
			17795va				
2200	2300		Belarus, Radio Belarus	7210eu	7255as		
			7390eu				
2200	2300	smtwhf	Canada, CBC NQ SW Service	9625na			
2200	2300		Canada, CFRX Toronto ON	6070na			
2200	2300		Canada, CFVP Calgary AB	6030na			
2200	2300		Canada, CKZN St John's NF	6160na			
2200	2300		Canada, CKZU Vancouver BC	6160na			
2200	2300		China, China Radio International		7240as		
			7350eu	7360eu	9590as		
2200	2300		Equatorial Guinea, Radio Africa		7190af		
			15190af				
2200	2300		Guyana, Voice of Guyana	3291do			
2200	2300		Liberia, ELWA	4760do	6070al		
2200	2300		Malaysia, RTM/Traxx FM	7295do			
2200	2300		Nigeria, Radio Nigeria/Kaduna		4770do		
2200	2300		Nigeria, Voice of Nigeria/Lagos	7255af			
2200	2300		Palau, T8WH/World Harvest	9965as			
2200	2300		Papua New Guinea, Wantok R. Light	7325do			
2200	2300		Russia, Voice of Russia	9890na	12040af		
			12070af				
2200	2300		UK, BBC World Service	3915as	5905as		
			5965as	6005af	6195as	9440as	
			9740as	9915af	12095af		
2200	2300		USA, American Forces Network		4319usb		
			5446usb	5765usb	6350usb	7812usb	
			10320usb	12133usb	12759usb	13362usb	
2200	2300		USA, EWTN Vandiver AL	15610me			
2200	2300		USA, Voice of America	5895va	5915va		
			7480va	7555va	9415va	11955va	
2200	2300		USA, WBCQ Monticello ME	5110am	7415am		
2200	2300		USA, WBOH Newport NC	5920am			

2200	2300		USA, WHRA Greenbush ME 11885af	
2200	2300		USA, WHRI Cypress Creek SC	11785va
			11885na	
2200	2300		USA, WINB Red Lion PA 9265am	
2200	2300		USA, WRMI Miami FL 9955ca	
2200	2300		USA, WTJC Newport NC 9370na	
2200	2300		USA, WWCR Nashville TN 7465na	9980na
			12160na 13845na	
2200	2300		USA, WWRB Manchester TN 5050va	6890va
			9385va	
2200	2300		USA, WYFR/Family Radio Worldwide	5950na
			9835sa 11740af 15440na	
2200	2300	vl	Zambia CVC/ The Voice Africa	4965af
2215	2300	vl/ mtwhf	Moldova, Radio PMR/Pridnestrovie	6240na
2230	2257		Czech Rep, Radio Prague 7345na	9415na
2230	2300		Guam, KSDA/ AWR 15320as	
2230	2300		USA, Voice of America/Special English	9570va
			11705va 15145va	
2236	2300	DRM	New Zealand, Radio NZ International	13730pa
2245	2300		India, All India Radio 9705eu	9950as
			11620as 11645as 13605as	

2300 UTC – 7PM EDT / 6PM CDT / 4PM PDT

2300	0000		Anguilla, Worldwide Univ Network	6090am
2300	0000		Australia, ABC NT Alice Springs	4835do
2300	0000		Australia, ABC NT Katherine 5025do	
2300	0000		Bulgaria, Radio Bulgaria 9700na	11700na
2300	0000	smtwhf	Canada, CBC NQ SW Service9625na	
2300	0000		Canada, CFRX Toronto ON 6070na	
2300	0000		Canada, CFVP Calgary AB 6030na	
2300	0000		Canada, CKZN St John's NF 6160na	
2300	0000		Canada, CKZU Vancouver BC6160na	
2300	0000		China, China Radio International	5915as
			5990na 6145na 7410na 9610as	
			11690as 11790as 11840na	
2300	0000		Cuba, Radio Havana Cuba 13790sa	
2300	0000		Egypt, Radio Cairo 11590na	
2300	0000		Guyana, Voice of Guyana 3291do	
2300	0000		India, All India Radio 9705eu	9950as
			11620as 11645as 13605as	
2300	0000		Malaysia, RTM/Traxx FM 7295do	
2300	0000	DRM	New Zealand, Radio NZ International	13730pa
2300	0000		New Zealand, Radio NZ International	15720pa
2300	0000		Papua New Guinea, Wantok R. Light 7325do	
2300	0000		Russia, Voice of Russia 9665sa	9890na
2300	0000		UK, BBC World Service 3915as	5965as
			6195as 9580as 9740as 9885as	
			11850as 12010as	
2300	0000		USA, American Forces Network	4319usb
			5446va 5765va 6350va 7812va	
			10320va 12133va 12759va 13362va	
2300	0000		USA, EWTN Vandiver AL 15610me	
2300	0000		USA, Voice of America 5895va	5915va
			7480va 9415va 11955va	
2300	0000		USA, WBCQ Monticello ME 5110am	7415am
2300	0000		USA, WBOH Newport NC 5920am	
2300	0000		USA, WHRA Greenbush ME 9615eu	
2300	0000		USA, WHRI Cypress Creek SC	5875na
			7315va 11785va	
2300	0000		USA, WINB Red Lion PA 9265am	
2300	0000		USA, WRMI Miami FL 9955ca	
2300	0000		USA, WTJC Newport NC 9370na	
2300	0000		USA, WWCR Nashville TN 5070na	7465na
			9980na 13845na	
2300	0000		USA, WWRB Manchester TN 5050va	6890va
			9385va	
2300	0000		USA, WYFR/Family Radio Worldwide	5950na
			9835sa 11580na 15255as 15400na	
			17750eu	
2300	0000		Zambia CVC/ The Voice Africa	4965af
2300	2315		Nigeria, Radio Nigeria/Kaduna	4770do
2300	2330		Australia, Radio Australia 9660as	12010pa
			12080pa 13690as 15230va 15240pa	
			15560va 17795va	
2300	2330		Palau, T8WH/World Harvest 15550as	
2300	2330		USA, Voice of America/Special English	9570va
			13755va 15145va	
2300	2345		USA, WYFR/Family Radio Worldwide	11740am
2300	2345	DRM	Vatican City, Vatican Radio 9755na	
2305	0000	mtwhf	Canada, R Canada International	6100am
2315	2330		Croatia, Voice of Croatia 3985eu	7375sa
2315	2330	mtwhf	Moldova, Radio PMR/Pridnestrovie	6240na
2330	0000		Australia, Radio Australia 9660as	12010pa
			12080as 13690as 15230va 15415as	
			15560va 17750va 17795va	
2330	0000		USA, Voice of America/Special English	7460va
			9570va 13755va 15145va 15340va	
2330	2358		Vietnam, Voice of Vietnam 9840as	12020as

New 380-400 MHz Trunk System Discovered

As milair enthusiasts across the country continue to explore the new Department of Defense 380-400 MHz LMR sub band, more trunk and conventional radio systems continue to be uncovered and reported to the editor of this column. Recently, monitors in the U.S. southwest have discovered a new, extensive trunk radio system at Marine Corps Air Station Yuma, Arizona.

The Land Mobile Radio (LMR)/ Enhanced Land Mobile Radio (ELMR) used in this trunk radio system is owned and maintained by MCAS Station Yuma. The Yuma Test Range has purchased equipment to use on this system consisting of approximately 50 mobile, base and handheld trunked radios. Talk groups are provided for operation and maintenance in restricted areas R-2310, R-2512, R-2510 and R-2507. Area base units are located in TACTS, EW, and WISS locations. Mobile units are installed in all vehicles for Yuma Test Range contractor and government use on this system.

It is believed that this is a Motorola P25 trunk system, based on the limited public documentation we have been able to locate.

Here is the latest frequency information we have for this system.

Site 1   385.8625/395.8625 386.9375/396.9375c 387.3250/397.3250
          387.6250/397.6250 389.7625/399.7625c
Site 2   386.3500/396.3500 386.4875/396.4875 386.6375/396.6375
          388.3875/398.3875c 389.6250/399.6250c
Site 3   385.7000/395.7000 385.9500/395.9500 387.2375/397.2375
          388.4000/398.4000c 389.3125/399.3125c
Site 4   386.0625/396.0625c 386.6000/396.6000 387.4750/397.4750
          387.7250/397.7250 389.1250/399.1250c
Site 5   385.0125/395.0125c 385.9875/395.9875 386.3000/396.3000
          386.4500/396.4500 388.5375/398.5375c
Site 6   385.8375/395.8375 386.8875/396.8875c 386.9375/396.9375c
          387.2500/397.2500 387.5750/397.5750
Site 7   387.9500/397.9500 388.7375/398.7375 388.8875/398.8875
Site 8   385.0250/395.0250 385.7000/395.7000 385.9500/395.9500
          386.0625/396.0625c 386.7875/396.7875 387.3750/397.3750
          387.5375/397.5375 388.1375/398.1375 388.4375/398.4375
          389.1250/399.1250c
Site 9   385.7125/395.7125 387.1750/397.1750 389.0625/399.0625
Site 10   385.0125/395.0125c 388.5375/398.5375c 386.4500/396.4500
          386.6000/396.6000 388.2750/398.2750

More work is needed to nail down the particulars of this new trunk radio system. If you have a field report you would like to share on this system, you can send it to the email address in the masthead.

❖ 380-390 MHz Spectrum Holes

Over the last few years of compiling data on frequency usage in this portion of the milair spectrum, we have been able to put together a reasonable picture of what changes DoD is making to the 380-390 MHz band. Based on monitoring, we can now confirm that there is a 10 MHz split between the input and outputs on all the new trunk systems built on these frequencies. The trunk radio system outputs will be between 380-390 MHz and inputs will be between 390-400 MHz. But overall, we still do not have a complete understanding of all the individual frequency assignments in this new band plan.

The following 175 frequencies in the 380-390 MHz band are spectrum holes (frequencies for which we have no assignment information) that we believe will be used for land mobile radio services somewhere in the Continental United States. These frequencies may be used for trunk radio systems, conventional repeater pairs, or simplex operations (frequencies in MHz).

380.0125 380.0375 380.0875 380.1375 380.1625 380.1875 380.2375
380.2875 380.3125 380.3375 380.3625 380.4000 380.5875 380.6125
380.6375 380.7500 380.7875 380.8125 380.9000 381.0375 381.2625
381.3625 381.3875 381.4125 381.4625 381.4875 381.5125 381.5375
381.5875 381.6125 381.6375 381.7125 381.7625 381.8000 381.8125
381.8625 381.8875 381.9125 381.9375 381.9625 385.1125 385.1250
385.1375 385.1500 385.1625 385.1875 385.2250 385.2375 385.2500
385.2625 385.2750 385.2875 385.3375 385.3625 385.4125 385.4375
385.4625 385.4750 385.4875 385.5375 385.6125 385.6375 385.6625
385.7625 385.8125 385.8250 385.8500 386.0250 386.1500 386.1750
386.2375 386.3250 386.3875 386.4750 386.5375 386.6250 386.7125
386.7500 386.7750 386.8375 386.8625 386.9250 387.0125 387.0375
387.0875 387.1125 387.1625 387.2125 387.2750 387.2875 387.3125
387.3500 387.3875 387.4250 387.5125 387.5625 387.6000 387.6125
387.6875 387.7125 387.8375 387.8625 387.9125 387.9625 388.0125
388.0500 388.1000 388.2875 388.3625 388.3750 388.4250 388.4500
388.4625 388.4750 388.5125 388.5750 388.6125 388.6250 388.6375
388.6625 388.6875 388.7125 388.7250 388.7625 388.7875 388.8125
388.8250 388.8625 388.9000 388.9125 388.9250 388.9375 388.9875
389.0125 389.0500 389.0875 389.1125 389.1500 389.2250 389.2500
389.2625 389.2750 389.3500 389.3875 389.4125 389.4250 389.4500
389.4625 389.4750 389.5125 389.5375 389.5625 389.5875 389.6000
389.6125 389.6375 389.6500 389.6625 389.6750 389.6875 389.7125
389.7250 389.7500 389.7750 389.7875 389.8125 389.8250 389.8500
389.8750 389.8875 389.9125 389.9250 389.9375 389.9625 389.9875

Speaking of spectrum holes, we have also uncovered another mystery in this 380-390 MHz milair band segment. Analysis shows what appears to be a large spectrum hole in the range from 382.0250 to 384.4375 MHz. No LMR systems have been located in this range even though aeronautical services have been moved out from this portion of the 380-400 MHz sub band.

Current thinking, based on previous occupancy in this spectrum, is that this may be a new segment reserved for wideband operations. There are at least five frequencies in the past that have been used in this frequency range for the USAF Northstar wideband system. There are also other known wideband assignments within this frequency spectrum by various departments from DoD. So monitors who follow wideband systems may want to watch this portion of the spectrum closely for new wideband signals.

❖ 380-390 MHz Aeronautical Assignments

Based on monitoring since establishment of this new DoD sub band, certain frequencies have retained their original aeronautical pedigree. We have been able to determine this, thanks to official frequency changes we have received. For those interested in these frequencies, here are the aeronautical frequencies in the sub band that we expect to remain after all the changes are made by DoD sometime in the near future.

Air Traffic Control
380.0250 380.0500 380.1000 380.1500 380.2000 380.2250 380.2500
380.3000 380.3500 380.6000 381.4500 381.5000 381.5500 381.6000
381.6500 382.0000 385.4000 385.4250 385.4500 385.5000 385.5500
385.6000 385.6500 387.0000 387.0250 387.0500 387.0750 387.1000
387.1500 388.2000

Command and Control (various services)
380.5000 380.7000 380.8500 381.0000 381.0250 381.1000 381.1250
381.2250 381.2500 381.3000 381.3500 381.4000 381.4750 381.5250
381.5750 384.5000 384.5500 385.0000 385.0500 385.2000 385.4750
385.5250 385.5750 386.0000 386.8750 387.1250 388.9500

The 380-400 MHz sub band is probably one of the most interesting segments of the milair band to explore today. If you haven't taken some scanner time to search this area, it would be worth your time to document what is happening in your local area. It is especially important to search and keep an eye on these frequencies if you are within line of sight of a military base in this country.

In a future *Milcom* column I hope to present some detailed information on the 390-400 MHz portion of this new DoD sub band.

❖ Latest Milair Frequency Changes

Here are the latest official frequency changes from the FAA and DoD. And that will do it for this month. Until next time, 73 and good hunting.

Official FAA and DoD Frequency Changes

30.1000 Lincoln Muni NE (KLNK) Army National Guard (FM), ex-38.8000
46.9000 New Century Aircenter KS (KIXD) Operations (FM)
225.4000 Oakland ARTCC (ZOA) Half Moon Bay CA RCAG Low Altitude, ex-380.3000
233.7000 FACSFAC Vacapes, Albemarle Sound NC/R-5301 and Harvey Point NC/R-5302A/B/C "Giant Killer," Washington ARTCC on 323.000 no longer controlling these restricted areas
235.6250 Schofield Barracks/Wheeler AAF Tower HI (KHHI) ex-235.650
235.7750 Lebanon Muni NH (KLEB) Tower, ex-385.500
235.9750 Southern California Tracon CA Approach Control, ex-381.6000
236.7750 Shreveport Regional LA (KSHV) Tower/Ground Control, ex-381.6000
239.2500 Anchorage ARTCC Barrow AK RCAG Approach/Departure Services
  Salt Lake ARTCC Ashton ID, Big Piney WY, and Blackfoot ID RCAG Low/High Altitude, ex-381.6000
244.8750 Providence Approach/Departure Control, ex-385.600 MHz
251.2000 Joint Base McGuire-Dix-Lakehurst NJ 108ARW Command Post "Torch Control" Primary
253.5000 Scott AFB/MidAmerica IL (KBLV) Tower
254.2500 Stillwater Regional OK (KSWO) Tower Primary (Delete)
257.1000 Cheyenne Regional (Jerry Olson Field) WY (KCYS) ANG Operations/Command Post, ex-225.525 (Cowboy operations/ command post)
263.0250 Scott AFB/MidAmerica IL (KBLV) Clearance Delivery
Southern California Tracon CA Approach Control, ex-385.4000
263.0000 Atlanta ARTCC (ZTL) Hickory NC RCAG (Sector 48/Wilkes Sector) Low Altitude Discrete: Approach/Departure services for various small airports via this RCAG
263.1000 Memphis ARTCC (ZME) - Nashville/Joelton TN RCAG Low Altitude Discrete: Approach/Departure services for various small airports via this RCAG
266.8000 Anchorage ARTCC (ZAN) Cape Romanzof AK RCAG High Altitude Discrete, ex-226.8000
  NAS Pensacola/Forrest Sherman Field FL (KNPA) ATIS, ex-267.6000
269.0250 Sheppard AFB/Wichita Falls Muni TX (KSPS) Approach/Departure Services
269.0750 Boston Consolidated TRACON Approach/Departure Control, ex-385.4500
269.4500 Bendigo Airport PA (74N) Harrisburg Approach/Departure Control
269.5250 Providence Approach/Departure Control, ex-380.250
270.3000 Seattle ARTCC (ZSE) Whidbey Island WA RCAG Low/High Altitude Discrete
273.4500 Cleveland-Hopkins International OH (KCLE) Tower/Ground Control/Clearance Delivery
275.8000 Scott AFB/MidAmerica IL (KBLV) Ground Control
276.4000 McClellan Palomar Airport CA (KCRQ) Tower, ex-392.0000
278.8000 Phoenix Sky Harbor International AZ (KPHX) Tower (Runway 08/26), ex-385.400
279.5750 Southern California (SoCal) Tracon Approach/Departure Control (SCT) ex-380.2000
279.6250 Southern California (SoCal) Tracon Approach/Departure Control (SCT) ex-381.5000
279.6500 Tucson International (KTUS) ATIS, ex-320.100
281.4250 Washington ARTCC (ZDC) New Bern NC RCAG Low Altitude Sector 25, ex-272.750
281.4500 Minneapolis ARTCC (ZMP) Duluth MN RCAG Approach/Departure Services
281.5500 Memphis ARTCC (ZME) Harrison AR RCAG Approach/Departure Control Services, ex-286.6000
282.2250 Chicago O'Hare International Airport IL (KORD) D-ATIS, ex-269.900
  Longview Approach/Departure Control (West at or below 5k ft) TX: East Texas Regional (KGGG), ex-385.4000
284.6500 Defuniak Springs FL (54J) Eglin Approach/Departure Control

284.6750 Kansas City ARTCC (ZKC) Richland MO RCAG:MOA Lindbergh-A/B/C, MOA Salem, ex-323.100
290.2250 San Antonio TX departure control service, ex-381.400 MHz
291.1000 Santa Barbara CA Approach/Departure Control, ex-397.9000
291.7750 Little Rock Approach Control: Adams Field AR (KLIT) Searcy Muni (KSRC), ex-385.6000
292.1250 D-ATIS Travis AFB CA (KSUU) ex-384.900
292.5000 Honolulu International/Hickam AFB HI (KHNL) 15AW Command Post "Shaka Ops"
306.9000 Miami ARTCC (ZMA) - Key West FL RCAG
306.9250 Potomac TRACON Approach/Departure Class B IC
307.1000 Miami ARTCC (ZMA) Pahokee FL RCAG Approach/Departure Services
307.1250 Northern California Tracon Approach/Departure Control (151-359), ex-387.0000
307.3750 Laughlin AFB TX (KDLF) Tower Primary, ex-279.5750
319.2000 Anchorage ARTCC (ZAN) Murphy Dome AK RCAG Approach/Departure Services
321.0000 Joint Base McGuire-Dix-Lakehurst NJ 108ARW Command Post "Torch Control" Secondary
323.1750 Fort Smith Regional AR (KFSM) Tower, ex-381.6000
323.2750 Southern California (SoCal) Tracon Approach/Departure Control - Catalina (KAVX), ex-387.0250
332.1500 Branson Airport MO (KBBG) ILS/DME Rwy 32 Glide Slope
335.5000 Anchorage ARTCC Unalakeet AK RCAG Approach/Departure Services
335.6250 San Antonio TX Approach Control Service, ex-392.100 MHz
343.2000 Wichita Radio KS (KICT)
345.0000 Port Angeles CGAS WA (KNOW) Coast Guard Operations (Port Angeles Air)
346.3250 Cleveland ON Approach/Departure Control, ex-354.0500
346.3500 Seattle ARTCC Lakeview OR and Klamath Falls OR RCAG Approach/Departure Services, ex-351.7000
346.4000 Jacksonville ARTCC (ZJX) Crestview FL RCAG Approach/Departure Control Services
347.5000 New Century Aircenter KS (KIXD) Operations
348.7250 Salt Lake ARTCC Sunnyside UT and Wilson Creek NV RCAG Low/High Altitude, ex-380.3500
349.0000 Tri City TN Approach/Departure Control
349.4000 Honolulu International/Hickam AFB HI (KHNL) Air Mobility Control Center "Shaka Ops"
350.2250 Salt Lake City ARTCC (ZLC) Miles City RCAG MT High Altitude NFP, ex-364.800
352.0000 Anchorage ARTCC (ZAN) Bettles AK RCAG Approach/Departure Services
352.0500 Dayton OH Approach/Departure Control, ex-291.1000 316.7000
353.5000 Jacksonville ARTCC (ZJX) - Dothan AL Low Altitude Discrete - Ashburn Sector (Sector 13): Approach/Departure services for various small airports via this RCAG.
353.7750 Savannah Approach/Departure Control (effective 2 Jul 2009)
353.9000 Seattle ARTCC (ZSE) Fort Lawton WA RCAG Low/High Altitude Discrete
354.0250 Cleveland OH Approach Control, ex-346.325
354.0500 Offutt NE Approach/Departure Control
354.1250 Denver ARTCC Francis Peak WY and Malad City ID RCAG Low Altitude, 387.0500
355.6000 Oakland ARTCC (ZOA) Ferndale CA RCAG and Half Moon Bay CA RCAGLow/High Altitude, ex-387.1000. This also moves the ARCP freqs for the following Aerial Refueling Tracks: AR-005L (East/West) and AR-255L (East/West).
360.7750 Ontario International CA (KONT) Tower, ex-385.6000
363.0000 Minneapolis ARTCC (ZMP) R-6903 Sheboygan WI
363.0250 Denver ARTCC Casper WY, Lusk WY, and Sundance WY RCAG Approach/Departure Services
363.1250 City of Colorado Springs Muni CO Clearance Delivery (KCOS) ex-385.500
370.9250 Denver ARTCC (ZDV) La Junta RCAG CO High Altitude NFP, ex-381.400
371.8750 Savannah Approach/Departure Control (effective 2 Jul 2009)
371.9250 Indianapolis ARTCC (KZID) New Hope KY RCAG Approach/Departure Services - Lebanon-Springfield (6I2)
377.0750 Denver ARTCC (ZDV) Hayden RCAG CO High Altitude, ex-397.875
377.1750 Denver ARTCC (ZDV) Denver and La Junta CO RCAG Low Altitude discrete, Approach / Departure Services, ex-387.150
379.1500 Chinook Approach/Departure Control, ex-380.200
379.1750 Denver International CO Ground Control (KDEN) ex-380.300
379.2750 Salt Lake ARTCC Cedar City UT and Delta UT RCAG Low/High Altitude, ex-381.4500
379.3000 Denver International CO Approach Control (KDEN) ex-381.500
  Bellingham International WA (WBLI) Tower, ex-385.600
379.9500 Grant County Approach/Departure Control, ex-385.500
379.9750 Salt Lake City UT (KSLC) Clearance Delivery, 387.1000

FED FILES

GOVERNMENT COMMUNICATIONS

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In Search of the Great White Whale

Everyone loves mysteries, and federal monitoring is full of them. In the years that I've owned scanners, there have been all sorts of stories, rumors and legends about various agencies and the radio systems that we seek out and attempt to monitor. Much like Captain Ahab searching for his whale, we are on a constant search for the unknown or mysterious frequencies. One federal monitoring mystery has been the portable trunked radio system that was rumored to be used by the White House.

As far back as trunked radio systems were in use, there were reports of a transportable UHF trunked system that was supposedly used by White House staff members when the president was traveling. Some reports even claimed that this system was carried on board Air Force One.

Despite all these rumors, no one ever managed to actually hear this system on the air. Early descriptions of this system had it using these frequencies:

406.4500/418.375 (input)
407.1250/418.275 (input)
408.8500/418.400 (input)
408.8750/418.500 (input)
408.9250/418.525 (input)

Along with the transportable system was a fixed UHF trunked system that was reported to be in use in the Washington DC area:

406.2000 MHz
406.3000 MHz
407.5250 MHz
407.9500 MHz
409.2500 MHz

Again, no one ever actually reported hearing this system on the air when these frequencies were being circulated.

Not much was reported on these systems until 2004, when I received some anonymous reports of a mysterious UHF trunked system that showed up in central Florida. It was heard using these frequencies:

406.4500 MHz
407.1250 MHz
407.8000 MHz
408.5250 MHz
408.9250 MHz

It was determined that you could track this system with a trunking scanner as a Motorola Type II system using 406.1000 MHz as the base setting, 25 kHz as the step, and 380 for the offset. This system was using analog voice channels with DES encryption.

Some reports said that this system appeared to be installed in a motor home parked at a hotel resort in the area. It was a nondescript white motor home with a pneumatic or hydraulic mast that carried the radio antennas and could be raised or lowered. Suspicion was that there was going to be some sort of event or meeting involving the President or a member of the Executive branch, but nothing was ever noted in local news coverage. After a couple of weeks, the system was off the air and the motor home was gone.

(I recall spotting the possible predecessor of this motor home in 1998, parked in the front parking lot of a hotel in the Cocoa Beach area. At the time I spotted this vehicle, the radio system was shut down and I did not realize that it was even there.)

Then in 2007, this system was again heard on the air in the same area in central Florida, but with a couple of new frequencies:

406.4500 MHz
407.1250 MHz
407.8000 MHz
408.5250 MHz
408.9250 MHz
408.9375 MHz
410.3875 MHz

This time the system was heard using P-25 digital voice channels. Listeners were able to determine that it was still a Motorola Type II system with a System ID of C518. On this trip, the system was noted to be using 406.2500 MHz as the base value, 12.5 kHz as the step, and 380 as the offset on a trunking scanner. The system was heard only using one talk group, TG32784, and all traffic was encrypted. Once again, no information was determined as to what the system was being used for.

But another important piece of information was passed along with these reports – the mobile system's license plate. The mobile home that carried this trunked system was seen carrying federal agency license plates bearing the agency letters of "EO." In the world of federal license plates, "EO" stands for the Executive Office of the President. You can read more about this part of the Presidential Administration at their web site:

www.whitehouse.gov/administration/eop/.

Looking over this site, you can see that there are quite a few groups and agencies under the EO office. They include:

The Council of Economic Advisers
The Council on Environmental Quality
Domestic Policy Council
National Economic Council
National Security Council
Office of Administration
Office of Management and Budget
Office of National Drug Control Policy
Office of Science and Technology Policy
Office of the United States Trade Representative
President's Intelligence Advisory Board and Intelligence Oversight Board
Privacy and Civil Liberties Oversight Board
White House Military Office
White House Office

Now which one of these offices would have the need for a transportable, encrypted radio system for their use? Reading through what the responsibilities of some of these offices are, you see mostly policy decisions and administrative duties, not real law enforcement of security responsibilities.

However, the White House Military Office has many duties that would definitely require an encrypted radio system. Under the WHMO are such agencies as the White House Communications Agency, the Presidential Airlift Group, the White House Medical Unit, Camp

David itself, Marine Helicopter Squadron One, Presidential Food Service, and the White House Transportation Agency. So there are all kinds of interesting possibilities in the White House Military Office.

❖ Closing in on the "Kill"

The next chapter in our federal monitoring mystery takes place just a few months ago, in late May of 2009. Monitors in the Boston area were excited by what appeard to be a new federal trunked UHF system in the area. Reports started coming in about this system using these frequencies:

406.3000 MHz
408.9375 MHz
410.3875 MHz
410.5875 MHz
410.8875 MHz
410.9875 MHz

Originally thinking that the UHF system heard in the Boston area was coming from a Navy shipboard system, local researchers were eventually able to track down the system coming from a – you guessed it – white mobile home with antennas on a mast. The motor home was parked in a fenced-in lot near the Port of Boston.

It was exactly as described in previous encounters and still bore the federal "EO" license plates.

Listeners reported that the radio system was showing a system ID of C518, same as the mobile trunked system heard in Florida, but with different frequencies being used. When the listeners in the area started researching the radio System ID on line, they discovered a database entry on the Radio Reference web site, **www. radioreference.com/apps/db/?sid=6202**. The frequencies reported on that system appeared to be the same as the Boston mystery system. Also, the entry on Radio Reference indicates that this system is located in the Quantico, Virginia, area and is "frequently off the air." That makes sense if it's on wheels and drives away every so often!

As part of the local intelligence gathering by federal monitoring enthusiasts, the system was monitored using trunking analysis software. It was determined that 68 radios and 8 distinct talk groups were being used in whatever this operation was. The system was using APCO P-25 voice with a NAC of N185 and most, but not all radios on the system were using encryption.

It was also determined that this system was using some very non-standard frequency pairs for the repeaters. Normally, newer federal UHF trunked systems use a 9 MHz offset for repeaters. For example, a voice channel repeater on 406.3000 MHz should have an input of 415.3000 MHz. In this case, listeners confirmed that the system was using repeater input frequencies in the 401 – 404 MHz band!

Not only is this band NOT allocated for federal land-mobile use, it is used for meteorological, earth exploration satellite and space operations. Here is what searching and listening found:

401.6125 MHz – input to 410.9875 repeater
401.7125 MHz – input to 410.8875 repeater
402.0125 MHz – input to 410.5875 repeater
402.2125 MHz – input to 410.3875 repeater
403.6625 MHz – input to 408.9375 repeater

Even though most radios were using encryption, the small amount of clear traffic did indicate some sort of surveillance operation was going on. But the user agency seemed to be operating on a regular workday schedule. Activity would start in the morning and then shut down around 7:30 – 8:00 p.m. each day.

Then, as suddenly as the system showed up, it left town after five days, leaving nothing but an empty parking lot in the Massport Port of Boston area.

❖ The White Whale Still Lives

So what can we determine from all these activities? My guess is that the system probably belongs to the White House Communications Agency, but what exactly it is being used for is still a mystery. Some suggest that it is surveillance training and location familiarization; others say that there are security operations going on for visiting dignitaries that are never made public to the media.

Who knows? But definitely keep these frequencies in your scan list and let us know if they show up with some activity in your area!

Have you seen this van? Like the great white whale, it will surface, then disappear. And then you're hooked...

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Amtrak photo policy: An editorial

Many railroad enthusiasts use scanners to assist in photography of railroads. Listening to crews and dispatchers lets them know what is operating in their area – and, in the case of a nearby train, what the next moves will be.

Up to now, favorite trackside locations for train watching and photography have long been the local passenger station, in areas where there still is passenger service. Sure, in the biggest cities you've either needed a ticket or special permission to access passenger platforms. That makes sense, given the volumes of people who pour through these stations daily.

But, in most cases, in the smaller cities and towns, stations were fair game, as long as you didn't get in the way of the paying passengers or the station crew.

Now, Amtrak has come up with a rather strange policy that limits photography on station platforms – allegedly for safety and security reasons.

Since the tragedies of 9/11 in 2001, vast numbers of policies have been implemented in the name of security. Most of them make little sense and contribute nothing to security. This is also true of the new Amtrak policy.

Okay, before I go on, I need to explain the policy for those of you who haven't heard about it yet.

❖ The policy and its problems

The basics of the new policy are that photography is okay on station platforms, as

On National Train Day, May 10, 2008, Amtrak train 80, the north-bound "Carolinian," arrives at Burlington, N.C., a small town that traces its origin back to the first shops of the North Carolina Railroad Co (NCRR). The station houses a museum tracing the history of the NCRR.

long as you have a ticket – and that photography is permitted on trains, as long as the crew doesn't object. Everyone else needs permission from Amtrak.

While apparently simple, these rules are full of ambiguity and problems. For example, who at Amtrak has authority to say yes or no? If a local employee says yes or doesn't care, no problem. But if a harried or disgruntled employee objects to photography, the issue gets kicked up the organization.

In the August 2009 issue of *Trains* magazine (the most widely read popular railroad magazine in North America), editor Jim Wrinn says the new policy is "like slapping one of your best friends because he stands in your yard to watch the sunset. The policy is an affront to rail photographers who found safety on station platforms in the nation's post 9/11 hysteria, but now find themselves unwelcome."

As Wrinn points out in his editorial, unlike at gate areas in airports, railroad station platforms – with the exception of the major city terminals already mentioned – have always welcomed people other than ticketed passengers. Families and friends come to see someone off; families and friends come to pick someone up.

So, is Amtrak now going to tell these people that they cannot make photos of their loved ones departing or arriving – because they themselves do not have a ticket?

Apparently so.

The policy is equally confounding to many of the Amtrak employees who staff the smaller stations. Many of these stations have only one or two employees on duty. They are busy selling tickets, answering questions, and receiving checked baggage that they then have to load into the baggage car, once the train has arrived.

Again, with the exception of the major terminals, tickets are only checked when passengers board a train.

Are they now sup-

Passengers board the train, headed towards Raleigh, N.C., Washington, D.C., and New York City.

posed to take on the additional duty of being on the station platform to see who does and doesn't have a ticket if they are making photos?

As *Trains* editor Wrinn and many others have pointed out, many of the stations used by Amtrak aren't even owned by Amtrak. Often the station building and adjoining grounds are owned by a local municipality, and as such qualify as public facilities. And, a variety of court cases, even post 9/11, have held that – with very minor exceptions – photography at public facilities is perfectly legal, even if some overly enthusiastic security guard or employee doesn't think so.

Some cities have paid substantial compensation to photographers, both professional and amateur, who were arrested or harassed simply for making photos.

❖ Personal experience

Though I've worked in many areas in my life, I consider myself a journalist, as that's what my college degree is in, and I take journalistic ethics very seriously. I wouldn't even try to guess the total number of news and feature stories – often with accompanying photos – that I've produced over my lifetime. A recent count showed that I've done more than 50 substantial magazine features on railroad and rail transit subjects alone, not counting these columns in *MT*.

As such, I can probably get permission to make photos at Amtrak facilities. But, that's a cumbersome process that takes time and dealing with the organization's public relations bureaucracy. And, why should I have to? I have built up many contacts in the railroad and transit sector.

If I get word that a train (particularly a

passenger train) passing through my hometown has unusual equipment on it, or that a train that doesn't usually show up here is being detoured, the local station is often the best place to see and photograph that equipment. That station also provides location context to photos made there, as it is a local landmark, and you can include a sign with the town's name into the image.

I've sold numerous photos to textbook publishers, many of them of transportation subjects. Often when I'm out with my camera, I'm not making photos for a specific project, but rather for my file – images that may be useful in the future, as has been the case with most images used to illustrate these columns.

I have the good common sense not to get in anyone's way when I make photos at and around passenger stations. I shoot hand-held and wouldn't think about setting up a tripod in a public area, except in the most unusual situations – and where I knew it wouldn't cause any problems.

What if a local newspaper or TV station needs a few shots of the local train for a news or feature story that evening? Are these people going to be asked to leave the station or to be made to spend time on the phone getting permission?

If a journalist is turned away or a private citizen gets hassled for a normal act and then goes to the media, Amtrak gets a big dent in the image it is trying to build. Many Americans have little awareness of railroads, particularly passenger trains. I still encounter people all the time who aren't aware that they can travel between two points by train – or who are pleasantly surprised after making their first train trip in recent years.

I'll freely admit that that I made photos at the local Amtrak station a number of times in June and early July (just prior to completing this column) without having asked for permission. I deliberately brought along my whole large photo bag. In part, this was an attempt to see if anyone would say anything. No one did. But then, several local station agents know me – and they've been busy preparing for a move to a new building.

But I still have apprehensions about making photos at the stations in other towns.

❖ Passenger train advocates

I know many staunch passenger train advocates – and I would count myself among them. Many of these passenger train supporters have circulated petitions, lobbied local officials, and contacted their members of Congress on behalf of Amtrak.

Many of these people identify themselves as passenger train advocates first and railroad enthusiasts second. They like travel by train and they like the options that passenger rail service provides. Most of them own both a scanner and a camera.

A few have contributed railroad photos to publications, but most simply make photos for themselves and to show to their friends and families.

The Carolinas Association for Passenger Trains (CAPT) is an advocacy group several hun-

dred members strong from North and South Carolina. Many of its meetings are held at or near passenger stations. Even when discussing the most serious issues, there's always time to pause when a train approaches and rolls by. And that sometimes means heading out onto the station platform to take a look or to take a photo.

❖ No sense

The arbitrary ban on photography makes no sense. And, perhaps the next step would to ban scanner listening on station platforms. That makes about as much sense as banning photography.

If you ban (or attempt to ban) photography but not cameras, how can you tell when someone is making a photo? With many digital cameras, you don't need to look through a viewfinder or to have the camera at eye level. Actually, you don't even need a camera: Many electronic devices, including cell phones and computers now can make photos.

With the trap (folding stairs) already closed, the conductor takes a final look to check out his train and activity on the platform before giving the engineer authority by radio to depart Burlington. Are photos like these now prohibited without prior authorization?

I hope that by the time that you read this – or at least by the time I write my next column, this policy will have been eliminated or at least radically changed.

❖ Overreaction

Another policy that appears to be an overreaction is that some railroads and transit agencies have totally banned even the possession of cell phones by operating employees while on duty. That's a reaction to recent accidents around the country.

But, there are many things that train and transit operators should not be doing while on duty. A rule that these operators not use cell phones and have them turned off should be enough. People who cannot abide by this rule should not be employed in such responsible roles.

We all know that the radio systems on board rail equipment are not perfect and that components in either the onboard or lineside remote

Amtrak is apparently among the points of interest (in my hometown of Durham, N.C.) – but not a place where Amtrak wants you to make photos on the station platform?

stations can fail. Having an alternate means of communication in an emergency could be essential.

Are these railroads and agencies going to body-search employees for cell phones and go through their possessions? A total ban on cell phone possession is just going to make some employees conceal their phones.

❖ More on passenger rail modes

In a previous column, I defined light rail as "The modern successor to the streetcar …."

While the above definition is essentially correct from a historical perspective, that leaves out the modern streetcar. Yes, there are modern North American systems in operation or on the planning boards that define themselves as streetcars.

So, what are the differences between modern light rail and modern streetcars? While light rail may have sections of street running – tracks set into streets and the rail system shares traffic space with other vehicles – most light rail system operate at their best when they are on their own dedicated rights of way.

Light rail systems are seen primarily as means of getting people into or out of the city center; modern streetcars typically fill the role of "circulator" – moving people around within the city center. To operate in that already built-up area, they rely primarily on street running.

At first glance there are not many obvious differences between modern light rail and modern streetcar vehicles. Streetcars often have a narrower profile and shorter length. The narrower profile lets the streetcars better mix with vehicle traffic in designated lanes; the shorter length lets the streetcars handle tighter turns. Streetcars also tend to have less sophisticated onboard electronic equipment.

BELOW 500 kHz

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LF Receiving Antennas, Part 1

One of the most common questions I hear is "What type of antenna should I use for longwave?"

When it comes to success below 500 kHz, nothing is more important than the antenna you use. Without a good antenna, you may hear nothing but noise and a few local beacons. This month, we'll explore two popular antennas for longwave reception – Random Wires and Ferrite Loops. Next month we'll discuss two additional types of loops, as well as Active Antennas.

❖ The Random Wire – Radio's Workhorse

I call this antenna a "workhorse," because it functions on many bands besides longwave and can even be used for amateur MF/HF transmitting when paired with a tuner and a good earth ground. Some folks loosely refer to all wire antennas as "longwires," but to meet the criteria for a longwire, an antenna must be at least a wavelength long – something that is difficult on LF. (A wavelength at 175 kHz is 1750 meters – roughly a mile!).

If you have the room, I recommend putting up a Random Wire antenna of 100 feet or more, for all-band reception (see Figure 1). Even if you're planning to add additional, band-specific antennas later on, a random wire will give decent performance over most parts of the spectrum and serve as a general-purpose antenna.

You can get everything you need to build a wire antenna at your local Radio Shack or hardware store. Almost any kind of wire can be used – bare or insulated (but you should use insulated wire for the lead-in). I've had good results using galvanized electric fence wire available at farm & home centers. This wire is inexpensive, strong, and easy to solder when new.

Insulators can be purchased outright, or you can make your own by drilling two holes through a piece of Plexiglas or short sections of PVC pipe. Almost any non-conductive material will work.

For support ropes, I recommend using a weather-resistant type such as black Dacron. I had an antenna up for over seven years using this type of rope and it showed no signs of wear. It is com-
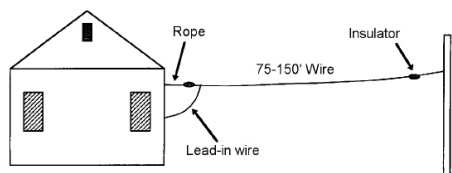
Figure 1. Random wires offer good all-around performance and should be a part of any listener's antenna farm.

monly seen at hamfests or advertised in ham radio magazines.

❖ Random Wire Performance

Your success with a Random Wire antenna depends heavily on your location. City and suburban dwellers may find this type of antenna to be a bit noisy amidst the sea of TVs, light dimmers, fluorescent lights and other static-generating devices. However, in rural or semi-rural environments, a wire antenna that is up high and in the clear can work extremely well. I heard my first Lowfer station (at 225 miles) on a random wire antenna years ago.

If noise is a problem, be sure to "clean house" first. Start by turning off dimmers, motors and other possible offenders while monitoring the radio, and see if you can eliminate the noise. Even if you can't get rid of it entirely, you might be able to reduce the noise to an acceptable level.

Random Wires can show directional properties, but it's difficult to predict the response of a given installation, due to variables in frequency, height above ground, and wire length. Such discussions are beyond the scope of this article, but there are excellent books that explore the subject in detail, including the *ARRL Antenna Book*.

❖ Loop Antennas

As one gets more serious about longwave, there are other antennas that should be considered. Loops, for example, provide solid benefits that will be of interest to low band monitors. The primary benefit of a loop is directivity. It can be rotated to null out interference or "pest" signals while focusing on a desired signal. This technique is used by many DXers to log two or more stations on a single frequency.

A second benefit is low noise pickup. Their small size (relatively speaking) and closed-circuit design make them less of a "noise collector" than a 100-foot wire strung across a yard. Signals may be weaker on a loop – unless it is amplified – but the signal-to-noise ratio is frequently much higher,

and this is preferable to just having strong signals. After all, what good is an S9 signal if it is covered in noise?

There are at least three types of loops that are popular today: Ferrite Loops, Multi-turn Tuned Loops, and Broadband Loops. The **Ferrite Loop antenna** is more common than you may realize. In fact, most households have at least one, well hidden inside an AM radio. These are the small black rods you have probably seen wound with fine enameled wire. The rod itself is typically made of a nickel-zinc mix that increases the inductance of the windings and concentrates an electromagnetic field around the antenna. In operation, ferrite loops provide sharp nulls off their ends and give a maximum response to signals approaching from their "broadside" planes.

Ferrite rods are among the smallest loops around, but they are generally not very efficient. An exception to this rule is an externally-tuned ferrite loop specifically designed for LF reception. These antennas typically couple to a set's internal ferrite rod via mutual inductance, or connect to the receiver with a short coax cable. Their larger size and tuning capability often provide greatly enhanced reception as compared with a stock internal antenna.

At present, commercial sources for high performance ferrite loops are limited. One firm that does carry them is Radio-Plus+ Electronics of Pensacola, FL (**www.dxtools.com**). If you prefer conventional mail, send an SASE to them at 3635 Chastain Way, Pensacola, FL 32504. Note: This firm has had difficulty procuring parts for their loops in recent years. I recommend checking on availability and delivery times before placing an order.

❖ Loggings

Our loggings this month are courtesy of **John Collins, KN1H (NH)**. John uses an Icom IC-R75 receiver and a DSP-599zx filter unit. His antenna is a 380-foot random wire. Thanks for your loggings, John. They show what can be accomplished with a basic antenna and a good receiving setup.

TABLE 1. SELECTED BEACON LOGS

FRQ	ID	ST/PR	CITY
205	ORE	MA	Orange
206	QI	NS	Yarmouth
209	GF	NY	Glens Falls
209	MJ	NH	Merrimack
216	CO	NH	Concord
220	BX	QC	Blanc Sablon
220	IHM	MA	Mansfield
227	SZO	ME	Fryeburg
227	TAN	MA	Taunton
233	CNH	NH	Claremont
240	LE	ME	Lewiston
260	UFX	QC	St. Felix De Valois
265	SXD	VT	Springfield
266	ZMM	QC	Colomban
268	VKN	VT	Montpelier
269	TOF	MA	Beverly
272	PFH	NY	Hudson
272	ZMR	QC	Belle-Riviere
275	R1	QC	Thetford Mines
276	LAH	NH	Lebanon
276	YHR	QC	Chevery
279	CQX	MA	Chatham
279	RS	MA	North Brookfield
284	ZMT	QC	Dorval
328	LC	NH	Laconia
332	BE	MA	Bedford
343	ZBM	QC	East Farnum
344	LNT	ME	Millinocket
346	LI	MA	Boston Logan
348	ZUL	QC	Dorval
353	LLX	VT	Lyndonville
356	AR	RI	Providence
356	HEU	NY	Schenectady
356	SUH	ME	Rockland
362	SC	QC	Sherbrooke
365	FIT	MA	Fitchburg
366	YMW	QC	Maniwaki
368	IMR	MA	Marshfield
370	DXT	MA	Dalton
375	BO	MA	Boston
375	JRV	VT	Morrisville
379	IVV	VT	White River Jct.
382	BT	VT	Burlington
384	F8	QC	Victoriaville
386	GMA	NH	Dalton
389	PVC	MA	Provincetown
395	GBR	MA	Great Barrington
397	OW	MA	Norwood
407	ZHU	QC	St. Hubert
417	EK	MA	Worcester

Numbers Stations Puzzle National Press

The imprisonment of retired US State Department analyst Walter Kendall Myers and his wife Gwendolyn on June 10 on charges of spying for Cuba ended up baffling both the USA national press and the worldwide press. The 72 year old Myers and his 71 year old wife were charged with using shortwave radios to receive messages from Cuba.

US Magistrate Judge John M. Facciola denied bail for the couple in Washington, saying that they were a strong risk of fleeing the United States. The *Washington Post* reported that Myers had more than 200 classified intelligence papers related to Cuba on his computer. The story shocked Washington, DC, since according to the *Post*, Myers is a member of one of Washington's most prominent families and is also a descendant of Alexander Graham Bell.

Both Myers defendants were charged with serving as illegal agents of the Cuban government and with conspiracy to provide classified U. S. information to the Cuban government. The charges potentially carry a sentence of five to twenty years in prison.

Both the *Washington Post* and the *Washington Times* reported that Myers received instructions from Cuba by shortwave radio. But, neither newspaper was able to report that the coded messages were sent via numbers stations. The role of numbers stations in communications with intelligence agents is a concept that has not permeated the mainstream news media.

The conservative-oriented *Washington Times* had some of the most interesting and amusing coverage of these arrests. The lead in the *Times* story read, "A retired State Department officer and his wife who are accused of spying for Cuba appear to have avoided capture for 30 years because their communications with the Caribbean Island were too low-tech to be detected by sophisticated U. S. monitors." The *Times* oddly reported that the Myers defendants communicated with Cuba via Morse code, although the US Justice Department has only alleged that the couple received messages from Cuba via numbers stations.

The U. S. Justice Department said in an affidavit submitted to the court that the couple received instructions from Cuba's intelligence services "over shortwave radio." The affidavit said that the Cubans use "simple number-to-letter codes" for their shortwave communications. That affidavit stated that both Myers and his wife personally met Fidel Castro in 1995.

The Justice Department affidavit also said that Cuban intelligence regularly "communicated with its clandestine agents in the United State by broadcasting encrypted radio messages from Cuba on shortwave radio frequencies." The affidavit said that the Myers couple had "an operable shortwave radio in their apartment and they told an FBI source that they have used it to receive messages."

Unlike many other newspapers and wire services, reporter James Gordon Meek of the the *New York Daily News* did report on June 5 that the couple "received instructions using a shortwave radio receiving 'numbers station' broadcasts from Havana they decoded with a key." According to the *Daily News*, both Myers defendants hired former Bush White House attorney Bradford Berenson as their attorney.

Various newspapers and wire services including *Aljazeera* also reported that the US government alleges that the couple supplemented their numbers station messages by swapping shopping carts with Cuban agents in Washington area supermarkets.

Reporter Circles Robinson attacked the US government and Secretary of State Hillary Clinton in the *Havana Times* on June 10 with a lead paragraph of "When you have spent a half century trying to overthrow a neighboring country's government, assassinate its leaders and officials, and umpteen other types of sabotage, it should be no surprise that somebody's conscience might go astray from the norm."

The US Department of Justice provided a press release alleging that Walter Kendall Myers was known as "agent 202" to Cuban intelligence, while his wife Gwendolyn was variously known as "agent 123" and agent "E-634." They held top secret security clearances at the US State Department Bureau of Intelligence and Research.

The *Washington Times*' reporter Carmen Gentile reported on June 18 that, "Shortwave radio is a remnant of an era that existed before the Internet and satellite communications, including the sophisticated eavesdropping equipment of the National Security Agency."

The BBC reported that Fidel Castro acknowledged meeting both Myers defendants in 1995, but that Castro characterized the charges as a "ridiculous tale."

Also in the UK, the *Belfast Telegraph* reported that Myers had previously unsuccessfully sought an appointment as White House envoy to Northern Ireland in 2003. The *Telegraph*'s source was Mitchell Reiss of the College of William and Mary in Virginia, the man who did get the job as White House envoy to Northern Ireland.

❖ What We Are Hearing

Monitoring Times readers heard more than two dozen different pirate radio stations this month. You can hear them too, if you use some simple techniques.

Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays. You sometimes have to tune your dial up and down through typically used pirate radio frequencies to find the stations, but more than 95% of all North American shortwave pirate broadcasts are heard on **6925 kHz**, plus or minus 30 or 40 kHz.

Radio Appalachia- Bluegrass and Beverly Hillbillies music. (Report via the FRN)

Barnyard Radio- Chuck Manson's agricultural pirate. (*barnyardradio@gmail.com*)

Blue Ridge Radio- Bluegrass music from the Blue Ridge Mountains of Virginia. (*blueridgeradio@gmail.com*)

Cactus Jack Radio- Europirate from Spain, sometimes heard in North America on 6910 kHz. (*cactusjackradio@gmail.com*, **http://cactusjackradio.blogspot.com/2009_06_01_archive.html**)

Captain Morgan- Audio from the old Twilight Zone TV show and rock music. (Report via FRN)

Dead Cat Radio- Cat sound effects on rock music. (*cattus.mortuus@gmail.com*)

Godzilla Radio- Early shows consisted of conversations between Godzilla and a small girl. (None known)

Gray Rhino Radio- The color of the Rhino sometimes changes. (*grayrhinoradio@gmail.com*)

KPR- "We Rock the Rockies" slogan. (None known)

Liquid Radio- Techno rock dance music format actually comes with an address. (*wwrbfm@gmail.com*)

MAC Shortwave- Old Radio Prague interval signal, followed by a replica of old top 40 rock music. (*macshortwave@yahoo.com*)

Northwoods Radio- A loon call begins Jack Pine Savage's rock music shows (*northwoodsradio@yahoo.com*)

Outhouse Radio- Rock music, SSTV digital images, and relays of other pirates. (Report via FRN)

Radio Azteca- Bram Stoker's DX comedy productions. (Belfast)

Radio Carp International- Relatively new pirate has a detailed focus on fish. (None announced)

Radio Casablanca- New pirate with music from the 1940s around the period of the movie "Casablanca." (*radiocasablanca@gmail.com*)

Radio Dismuke- This news station has been programming antique pop music from the 1930s. (Unknown)

Radio First Termer- This production from the Vietnam War is sometimes relayed by other pirates. (None, but has a web site **www.ibiblio.org/jwsnyder/rft/rft.html**)

Radio Free Speech- Announcer Bill O. Rights with rock music and comedy sketches. (Belfast)

Radio Gaga- Rock music and SSTV digital pictures hosted by Uncle Bob. (*popeonthepoint@gmail.com*)

Radio Jamba International- Rock music shows, both on the pirate bands and via **WBCQ** relays. (Now none)

Radio Marlene- Rock, disco, folk, and related music "from the Jersey Shore." (*radiomarlene@gmail.com*)

Radio Mushroom- Yet another new classic rock music pirate. (*radiomushroom@gmail.com*)

Radio XXP- New rock music pirate. (*radiostationxxp@gmail.com*)

Sunshine Radio- Rock music. (*grasscutterradio@yahoo.com*)

Sycko Radio- Sycko's rock music shows have been featuring cameo IDs by other pirates. (*syckoradio@yahoo.com*)

Time to Amp Things Up

I approach this month's subject with a bit of a nervous twitch. As a dedicated ultra low power operator (QRPer), I tend to break out in hives when I find myself talking about the subject of… amplifiers. But as a full service amateur radio sage, I must grit my teeth and cover myself with Calamine Lotion to bring you loyal readers the important information you need on this subject.

Putting a "Full Gallon" HF amplifier into service is a major undertaking and expense. I would not want you folks wandering through the power amp forest without a map and compass. So let's give this subject some study.

How much power is enough power?

In general, hams are limited to a maximum Peak Envelope Power (PEP) of 1500 Watts – more than some commercial radio stations get to use. More than enough to put your signal just about anywhere in the world that will support propagation on your frequency of choice.

That said, take a close look at the rules we are supposed to play by. Amateur Radio practice requires that we only use *as much power as is necessary* to complete the QSO. More than that is wasted energy and opens up the potential for interference with other folks. Turning down the wick is always the order of the day.

But the ability to run the full 1500 Watts is your privilege as a ham; just play by the rules and try to be a good neighbor when you crank it up.

It's gonna cost ya

Used HF power amplifiers cost hundreds of dollars; new ones routinely run thousands. Before you run to the amplifier store, you may want to give your radio system a good look. Can you do more to maximize your signal in less expensive ways?

Without going into the math and science, pumping 1.5 kW into a low hanging dipole is usually not going to show much real benefit over a hundred watts or so fed with high quality coax into a beam antenna at a competitive height. A short tower and beam is still less expensive than an amp and is likely to yield better overall results.

Then again, a tower and beam supplemented with an amp will clear up most DX pileups. It's your bank account. Choose wisely.

It's gonna cost ya more

Depending on the amplifier you choose, you will need to address its unique power requirements. Any amp will more than likely require, at minimum, a dedicated power circuit. Don't plan to plug your amp into a wall socket shared by your transceiver. Many amps even expect a 220 Volt line instead of the standard 110 Volt house wiring. This is work you will want to have done by a professional and will need to be figured in to your cost of doing business.

New vs. Used

I have already mentioned that the difference in cost between a new amp and a used amp is quite significant. There are good reasons for this. This is because even well cared for amps will wear out components over time. Amps work hard and they get tired as they age. Tubes get stale. Power supply and RC circuit components give up the ghost from wear and tear.

You can find a good used amp in the $500 price range that works fine out of the box. Two weeks later you could be investing a couple of hundred dollars in replacing blown filter capacitors or even more if the tube (or tubes) gives up the ghost.

The good news here it that you will probably still have significant savings over a new unit. But you need to be prepared to put the time, effort, and costs into keeping that older amp alive. If you are going the used route, as I always say in this column, do yourself the favor of dealing with hams and not other folks. Lots of amplifiers out there on the used market were "Heaters" modified for illegal use by rogue CB operators and Free Banders. The quality of work by these non-ham types is suspect at best.

Once you have found a good (and safe) deal on a used amp, before you lay down your cash, do some Web crawling and see what other folks' experiences have been with the unit of choice. Try to track down a manual or schematic on line. Get a sense of the major components and their replacement cost. A $300 dollar amp is no deal if you have to spend $400 tracking down fresh tubes.

You need to remember that an amp poorly adjusted and tuned even only once can be horribly damaged.

The argument for new, in spite of the expense, is that just about all the new amplifiers on the market have a lot of circuit design related to protecting the amplifier from damage through incorrect use. Auto-tuning and memory circuits that protect the RF deck in new amps are expensive, but they do assure that your amp will live a long and healthy life.

Also, there are even solid state amps that can run full legal power. They remain expensive, even on the used market, but they may also be considered.

Speaking of tubes

The RF Power tube is the main part (or parts) in most amps. Everything else in the box is there to keep that tube running happily. As I mentioned before, failure to properly tune and adjust any amplifier will, at minimum, shorten the life of an amp and, in the worst possible case, destroy it. A weakened or damaged tube replacement is a high dollar proposition.

While replacements can usually be found for most common RF power tubes (something else to check out before buying used), quality control is not what it used to be. Again, reaching out to the amateur radio community – either on the air or over the Web – will help you wade through the possibilities related to tube replacement.

Is your tuner up to the task?

Amps are able to do what they do because they are a tuned circuit. They look for properly balanced signals coming in and a proper feedline and antenna condition going out. In most cases, you will find yourself using a tuner between the amp and the antenna to accomplish this. Make sure that your antenna tuner is rated to handle the power levels you aspire to. Also, tuner adjustment is critical when playing with amplifiers.

QSK anyone?

QSK is a common enough feature on modern CW rigs. It allows for high speed switching

of the transceiver's internal RF amp to allow CW ops to hear returning signals between their personal dits and dahs. If you are interested in this type of operation (many high speed CW folks and CW net operations use QSK), you need to know if your amp of choice supports this directly or if it requires a separate QSK circuit to accomplish this.

❖ I say three times: Read the manual!

A properly tuned and tweaked RF Amplifier is the pinnacle of electrical design and engineering. It is like a thoroughbred race horse. Treat it right and it will perform its task well and with maximum output for minimum effort. Failure to understand its care and feeding will make for a bad day for both of you.

Take the time, even before you make your amplifier purchase, to fully understand how to set up the amp and adjust it for proper use. Understand the amp's switch positions and metering circuits completely so there is no possibility of making errors in judgment or adjustment. This will assure that you and your amplifier will have a long and happy association with a minimum of expense.

❖ What about VHF and UHF?

All of the abovementioned stuff still applies. But remember, at VHF and UHF frequencies, you can do quite a bit more with antenna height, gain, and directionality than your HF brothers and sisters. Overcoming the losses in your feedline will, as often as not, give you a significant boost in the VHF/UHF bands.

Still, if you are planning to bounce signals off the moon, you will want to look in to some level of amplification. The good news in the VHF/UHF range is that you have many more choices in amps that run from a 100 watts all the way up to the full gallon, so you can buy in at any price range your wallet can handle.

Well, if I haven't scared you away from considering an amplifier with my abovementioned comments and concerns, let me tell you a little secret. Old Uncle Skip has actually used an amp a few times in his ham radio career. (Don't tell my QRP buddies.) I have worked on the team of some multi-op contest stations and I must admit, there is nothing quite like keying up into a pileup and making the QSO against all that QRM. Power, used wisely, has its distinct advantages.

❖ 6 Metre Handbook

by Don Field, G3XTT
ISBN: 9781-9050-8647-4
176 pages Published by The Radio Society of Great Britain
Lambda House
Cranborne Road
Potters Bar, Herts EN6 3JE
www.rsgb.org
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The American Radio Relay League
225 Main Street
Newington, CT 06111-1494

www.arrl.org/shop
1-888-277-5289

Okay, don't get your spell checkers in an uproar. This book comes from one of our amateur radio brothers in the UK and they spell Meter as Metre. Get over it!

My relationship with the "Magic Band" has always been a curious one. That is because I came up as a ham in a part of the world where 6 meter rigs tended to cause a lot of TVI to local television channels. But we had a very active VHF community in the region, so folks worked together to work things out. These days you would be hard pressed to find a commercial HF transceiver that does not give you a 6 meter band position.

That was then, this is now, but in either world I would be glad to have Dave G3XTT's book to guide me into the unique world of the 6 meter band. The book begins with a chapter covering the current state of the art as to antennas and transceivers. A great deal of useful information is there if you are new to the band. The chapters on propagation and 6 meter operating practices are essential reading, even for more experienced Sixers.

Propagation is a unique brand of radio witchcraft in the best of circumstances. 6 Meters will throw the inexperienced operator a lot of curves. With Don's book, you will learn how to take advantage of the many surprises and opportunities 6 can offer.

These essential chapters are followed by coverage of digital and weak signal modes, as
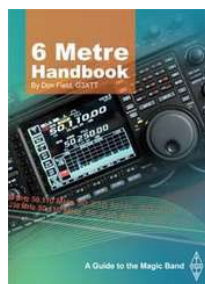
The Crystal Ship- The Poet uses odd frequencies such as 6876 kHz, often in AM mode. (Belfast)

Thinking Man Radio- Rock music. (*Thinkingmanradio@gmail.com*)

Voice of KAOS- Protests against chaos spiced with rock music. (*voiceofkoas@gmail.com*)

Voice of the Beast- Relatively new; classic rock. (*voiceofthebeast@gmail.com*)

Voice of the Robots- Robots as DJs for the rock tunes. (*voiceoftherobots@gmail.com*)

WBNY- Commander Bunny's clandestine radio parody from the Rodent Revolution. (Belfast and *rodentrevolutionhq@yahoo.com*)

WEAK Radio- Rock music and comedy. (*weakradio@gmail.com*)

We Monkey Radio- Sometimes using a WMR call sign, this one promotes the monkey concept of DXers that was first advanced by **WBNY**. (Belfast)

Wind Up Radio- Like many stations, they combine rock music and pirate advocacy. (Unknown)

WMPR- "Dance party" techno rock music. (None; QSLs occasionally at the Kulpsville Winter SWL Festival)

WPON- "The Weapon" has a leftist political message that it uses explosion noises to reinforce. (None)

Wolverine Radio- Id sounds like "Long Range Radio," but the actual name is really Wolverine. (None)

WTCR- "20th Century Radio" plays music from various decades of that century, from ancient pop to rock. (Belfast)

❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign locations. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14711; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 146,

well as information on international operation, repeaters, portable and DXpedition work, as well as contesting and common QSL practices for this band.

The book includes an interesting chapter on something once unique to UK hams but beginning to spread around the world: 4 meter (70 MHz) operation. With similar characteristics to 6 meters and band access beginning to open in other countries, maybe someday we will see a 4 meter position on our band switches.

If you are planning to play on the "Magic Band," you will want the *6 Metre Handbook* on your bookshelf.

Have fun. I will see you at the bottom end of 40 meters running "full gallon" QRP (5 watts).

Stoneham, MA 02180; and PO Box 293, Merlin, Ontario N0P 1W0.

The best bulletin for submitting pirate loggings is the e-mailed Free Radio Weekly newsletter, *freeradioweekly@gmail.com*. A few pirates will sometimes QSL reports left on the outstanding Free Radio Network web site, at **www.frn.net**.

❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors**:** Brian Alexander, Mechanicsburg, PA; Kirk Allen, Ponca City, OK; Scott Barbour, Jr., Intervale, NH; Skip Arey, Beverly, NJ; John T. Arthur, Belfast, NY; Jerry Berg, Lexington, MA; Artie Bigley, Columbus, OH; Richard Cuff, Allentown, PA; Rich D'Angelo, Wyomissing, PA; Ragnar Daneskjold, North America; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Captain Ganja, Belfast, NY; William T. Hassig, Mt. Prospect, IL; Rick Helmke, Auburn, AL; Ed Kusalik, Camrose, Alberta; Chris Lobdell, Tewksbury, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penns Park, PA; Tom Marcotte, Lafayette, LA; Bill Matthews, Columbus, OH; A. J. Michaels, Blue Ridge Summit, PA; Mark Morgan, Mark Morgan, Reading, OH; Gene Patterson, Gibsonia, PA; Adrian Peterson, Indianapolis, IN; Curt Phillips, Raleigh, NC; Lee Reynolds, Lempster, NH; Mike Rhode, Columbus, OH; Lee Silvi, Mentor, OH; Hector Vazquez, Los Angeles, CA; and Peter Veith, no QTH.

How to Deal with Received Noise

Noise received by our antenna is one of the major obstacles to effective radio communication. Fortunately there are things that we can do to reduce the negative effect of that noise on our communication.

❖ Some Types of Interference

Perhaps the most familiar kind of noise is the continuous low-level crackling sound that we hear from a high-frequency receiver which is tuned to a frequency where no stations are transmitting. This noise is often referred to as "static." Some of this noise can come from electrical appliances. However, in general, the primary source of this noise is lightning strikes from various places around the world.

Lightning bolts create radio-frequency noise across a wide swath of the radio spectrum. These electrical-noise signals are actually radio signals, and, when sufficiently powerful, they propagate far and wide. Thus, there is usually a low-level background of this noise arriving at our location from various electrical storms around the earth. Of course, when lightning is striking locally, the level increases dramatically, and we hear violent crashes of noise in our AM receivers.

Another kind of electrical noise is called "impulse" or "shot" noise. This noise occurs on a periodic basis, with each "shot" followed by a short interval of silent time, and then another shot, and so on. This kind of noise is sometimes produced by certain electrical appliances, but more frequently it is from the ignition system of an automotive engine or from an electric fence, of the type used to contain livestock.

A steady, ordinary, radio signal whose frequency is close to the frequency of a signal that we want to receive can produce annoying whistles called "heterodynes." Some receivers have notch filters which can reduce or remove these signals. Some after-market add-ons to the receiver's audio output have audio notch-filters which can also help. Sometimes narrowing the receiver's bandpass reduces this interference.

❖ Extra-Terrestrial Origins

Interestingly enough, the reactions going on in our Sun produce considerable electrical noise. There are also noise signals received on Earth which originate from the center of our galaxy. Generally, extra-terrestrial noise occurs from about 15 MHz and higher. At VHF and higher frequencies, extra-terrestrial noise is more prominent than at lower frequencies.

❖ Reducing Noise Prior to Reception

We can begin reducing noise reception right at the antenna system that receives both the desired signal and the unwanted noise. Most antennas have nulls (directions of minimal response) in their radiation-reception patterns. Sometimes you can orient your antenna such that the antenna has a null in the direction of the offending noise source. At times this can be quite effective.

The deep nulls of table-top loop antennas are particularly useful for this. Some antenna books, such as the *ARRL Antenna Book*, give radiation patterns showing nulls for many kinds of antennas.

If the antenna's feed line is routed through an area with a high noise-level, you may receive noise via the feed line. This is particularly true for open-wire lines. Moving the line farther from the noise source, and switching from an open-wire line to a coax feed line can often help. Of course, when your antenna itself is close to a source of electrical noise, moving it away from that source should help.

Arcing from high voltage leakage on power-line poles is sometimes a source of noise. This is more likely on lower bands like 80, or 160 meters. To find a noise source, a small, portable AM broadcast receiver with its ferrite rod antenna will sometimes provide sufficiently directional reception.

If the suspected source is a power-line pole, try hitting the pole with a ball bat while listening to the noise on a receiver: hitting the pole may produce a noticeable modulation in the noise. If you find an offending pole, then contact your power company. They are often co-operative in cleaning up the problem.

❖ Reducing Received Noise After Reception:

Often we cannot conveniently use the techniques described above to reduce noise prior to reception. Fortunately, many receivers have noise-reduction circuits built into their design. Some of these device act as limiters, or clippers, and clip (fig. 1B) the interfering noise peaks shown in fig. 1A.

There are other circuits that actually remove the signal segment containing the noise pulse (fig. 1C): these are called "noise blankers." Problem noise can often be reduced to tolerable levels just by switching in your noise-reduction circuit and adjusting its threshold level. Noise blankers are often more effective at reducing noise than are noise clippers.

Noise reducing antennas are special antennas that utilize a separate "noise antenna" which is located in the general vicinity of the receiving antenna. The signal from the noise antenna is processed in such a way that the noise signals from that antenna can be added out-of-phase to the noise received on the main antenna. With careful adjustment, this can sometimes significantly reduce or cancel the noise.

There are noise reduction techniques that
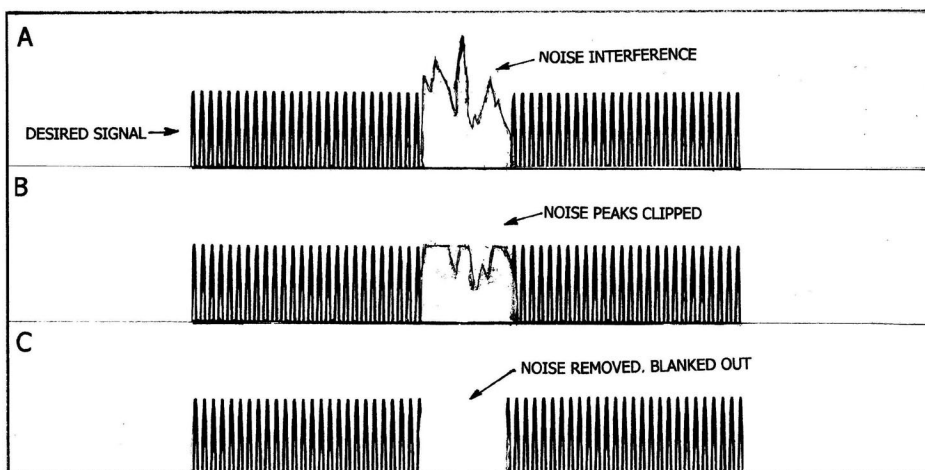
Fig. 1. A STEADY-STRENGTH INCOMING SIGNAL WITH ACCOMPANING ELECTRICAL-NOISE INTERFERENCE (A), THE SAME SIGNAL WHEN USING A NOISE LIMITER (B), AND THE SAME SIGNAL AS IN "A" ABOVE WHEN USING A NOISE BLANKER (C).

RADIO RIDDLES

Last Month:

I asked: "The Beverage Antenna mentioned above functions in a manner rather different than most other antennas. What is this unusual mode of operation? Also, the Beverage Antenna is frequently referred to by what other name?"

Well, in most antennas, passing signals will induce current in the antenna if the polarization (direction of the wave's electric field) of the wave and polarization of the antenna are sufficiently similar. In contrast to this, a Beverage antenna, sometimes called a "wave antenna," responds to waves that are tilted a bit towards being parallel to the antenna, and it collects energy from the wave as it travels along the length of the antenna. This action is similar to the action of a leaky transmission line.

This Month:

Although noise is generally something we want to avoid, there is at least one piece of antenna test gear that requires noise for its proper functioning. What is it called, and of what value is it to us in working with our antennas?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then, Peace, DX, and 73.

can be tried in the absence of having a noise-reduction circuit. One is to use your tone control (if your receiver has one) to de-emphasize the high frequencies in the received audio. Much of received noise's energy is in the higher audio frequencies, and so this technique sometimes helps.

Another technique is to use a filter with a more narrow passband. This excludes some noise on the frequencies adjacent to the desired signal. Unfortunately, narrowing the passband too much may produce an undesirable ringing in the audio output of the receiver, and this may negate the noise reduction obtained by this technique.

❖ Perhaps the Best Filter of All

Old timers will tell you that one of the best noise filters is improving your ability to copy the desired signals even when noise is present. With practice we can actually learn to copy signals accompanied by a considerable amount of noise. It's amazing how our own ears can learn to filter out the desired signal from the accompanying noise.

The S-20-R Finds its Voice

❖ Salvaging Parts

Last time, with the S-20-R removed from its wraparound cabinet at last, I turned my attention to repeating the operation on another S-20-R, a derelict that I wanted to use for parts. Though its chassis was well rusted, it had a much better cabinet than the "good" set – and there were a couple of other parts I wanted to get my hands on. One of these was the bandswitch control shaft (with its knob); the other was the speaker.

The bandswitch shaft and knob was needed to replace the ones I had drilled into as the best expedient for removing the knob. The speaker was needed to replace a non-original unit that had been "kluged" into my good set when, apparently, the original had burned out. Applying the knowledge I had gained in "de-cabineting" the first set, I made short work of doing the same on the second.

I removed the speakers from both sets first. These were floating loose – attached to the chassis only by their leads – having originally been mounted on the now-removed wraparound cabinet/front panel assemblies. I made careful notes on the connection points of the original equipment speaker that had been in the parts set. Now I could move that speaker to a safe place and would no longer have to be concerned as I moved the chassis around to different positions during restoration.

The bandswitch control shaft was easily removed. After taking out the two screws holding its front flange to the chassis apron, the shaft was carefully pulled out, withdrawing it from the three wafer switch segments in the bandswitching system. The damaged shaft

Bandswitch shafts are was easily withdrawn from switch wafers, making it convenient to replace shaft damaged by drilling with shaft from parts set.

Thanks to their compact size, the new electrolytic caps could be shoehorned into the space under the original multi-section can.

from the original set was withdrawn in the same manner and the one from the parts set installed in its place.

But, before removing either shaft I made sure that each bandswitch was set to the same band. That way, I'd be sure that the replacement shaft would line up properly with the slots in the switch wafers.

❖ Replacing the Filter Cap

During a previous work session, all capacitors had been replaced except for the three-section filter electrolytic. This was in a can mounted above the chassis and containing one 30-ufd and two 20-ufd sections. As is usually my practice in replacing multi-section caps, I disconnected the original can, leaving it in place on the chassis for cosmetic purposes.

The three sections were then replaced by individual units mounted on a terminal strip fastened below the original. I was very grateful for the small size of modern electrolytics because space under the original electrolytic was limited. And it was important for me to install the replacements on that spot so that leads that had been connected to the original could be easily moved over to the replacements.

To install the terminal strip it was convenient to enlarge the hole in its mounting lug so it would fit over one of the twist lock mounting

posts of the old can. Application of a little solder firmly bonded the lug to the post. A couple of the new electrolytic sections were installed on the strip in advance of mounting, because afterwards there would be accessibility problems.

Connecting up the new electrolytic sections presented a bit of a problem, because a couple of the wires had to run to the speaker field coil (which also serves as a filter choke). And the last thing I wanted to do at this stage was to run wires to the speaker.

In addition to those two wires, three others had to be run from the chassis to the speaker. I solved the problem by installing a terminal strip above the chassis just behind the space that the speaker would occupy. All of the leads from various places under the chassis to the speaker would be connected instead to this terminal strip, which would be wired to the speaker later on.

Rather than drill a mounting hole for this terminal strip, I just sweat-soldered its mounting lug directly to the chassis surface using a 150-watt Weller gun. It made a nice strong bond.

Before temporarily putting the chassis aside, I squirted contact cleaner into small openings I found in the sides of the audio and r.f. gain controls and worked the controls several times. Unless cleaned, these controls always make earsplitting noises when operated after a long-disused set is brought to life. I would have liked also to have treated the contacts on the three bandswitch segments, but I had heard some war stories about certain bandswitch materials being susceptible to attack by contact cleaners.

❖ Cabinet Cleaning

Even though the parts set cabinet was the better of the two, it still presented a dingy and – especially on the top – pock-marked appearance. I went after it with some Turtle-brand rubbing compound and scratch remover from a can that I've had in the shop for years. This is a paste preparation that's applied with a damp cloth and a little elbow grease, then wiped off (with more elbow grease) before it is completely dry. Leaving the damp cloth in the can helps keep the paste from drying out over time.

I was very gratified at the result. Sure, there were still some dings, scratches and pits, but the overall impression was fresh and gleaming. I did try to rub carefully around the silk-screened panel markings, but in the end it really didn't seem necessary. The markings remained absolutely unaffected.

I was much more careful cleaning the celluloid main and bandspread dials. I had the
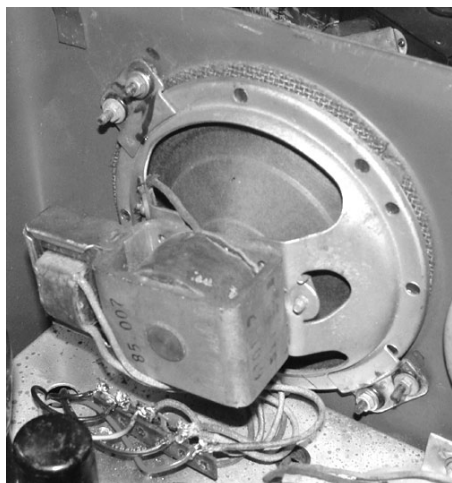
Speaker from parts set was re-grommeted and substituted for "kluged" replacement speaker. Note terminal strip installed behind speaker to simplify wiring to chassis.

nerve-wracking experience once of wiping the markings right off of a similar window on a Hallicrafters S-40 (which is essentially a later version of the S-20-R) restored earlier in this column. I had to resort to replacing the lettering with Press-Type. And Pres-Type is not so easy to buy these days – most of its applications having been taken over by the computer.

The S-20-R windows were quite cloudy, but I was careful not to wipe too hard or strive for perfection. And the soft cloth I used was dampened only with water. In the end, I was able to preserve the lettering and clean the windows enough to make them decent.

The restored radio was now essentially ready to power up for testing, but of course I wouldn't be able to accomplish that without a speaker or a front panel. So I decided now to install only the wraparound front panel/bottom section of the cabinet (which contains the speaker), leaving the top/rear section off to maintain as much access as possible.

❖ Cabinet Installation

Thanks to the terminal strip I had installed to allow postponing the wiring to the speaker, I was able to mount the speaker to the panel/cabinet in advance of installing the latter on the set. This saved a lot of trouble, because the installation of an original equipment speaker – which I now had – requires the simultaneous juggling of two pairs of small machine screws, with nuts and washers, through grommet-lined holes in the speaker mounting brackets. Much easier if one can lay the front of the panel flat on the bench with the screws sticking up!

But before mounting the speaker, I had to replace the old grommets – which had hardened and seriously deteriorated. After scraping all that off, I found that I had some grommets of a perfect size to fit the speaker bracket holes with just a little persuasion.

With installation completed, it was a very gratifying sight to see a properly outfitted and secured speaker in place of the previous jury-rigged unit secured with makeshift brackets and a couple of screws.

After slipping the main and bandspread

dials (removed earlier to facilitate disassembly) back on their shafts, I was ready to slide the chassis into the wraparound front panel/bottom section of the cabinet. That was done without incident, and I could install the mounting hardware.

This included the two large bolts that secure the back corners of the chassis to the cabinet bottom as well as the nuts securing various switches and other controls to the front panel. The special ring nut wrench made available to me through the good offices of a reader really came into its own here, allowing me to tighten those nuts without scarring the panel.

Now I was ready to install the tubes and knobs. The tubes had been tested at the beginning of the project, but both they and the knobs were quite dirty. I mixed up a little laundry detergent and water and went after the knobs with a rag and a small brush. They came out gleaming bright with very little effort.

The same solution was used on the tubes – except I was careful not to clean around the type markings of the two glass ones. Those markings, originally put on by some sort of rubber stamp, are quite fragile and easily wipe off during cleaning.

In this set, the type 80 rectifier had been replaced by a 5Y3. A 5Y3 is electrically an 80 – but it has an octal base instead of a 4-prong one. I imagine that whatever component failure destroyed the 80 had also taken with it the field coil of the original speaker.

A previous repairer had made up a neat little adapter by mounting an octal socket inside a base from an old 4-prong tube. He is probably the same person who kluged a replacement for the speaker. I liked his 80 replacement better than his speaker replacement, so, after checking to see that the adapter was electrically correct, I decided to keep the 5Y3.

I wasn't able to reconnect the pilot lights yet because they are mounted on brackets that are part of the not-yet-installed cabinet top and back. But I did disconnect the non-original switch that had been installed to control the lights. Of course, the hole that had been drilled in the panel for that switch went away when I substituted the panel from the parts set for the original one.

After a workover with rubbing compound and with its knobs detergent-cleaned, the front panel has a much fresher appearance.

❖ The "Smoke Test"

Since I always change out all the paper and electrolytic caps during restoration, I don't bother with doing start-ups on a Variac. I do hang a meter on the B plus line to make sure the line has not somehow become shorted. With that in place, I plugged in the S-20-R and turned it on. I was ready to see either rising smoke or a rising meter. I saw neither. The heaters were lit but the radio was stone cold dead.

I tried an 80 in place of the 5Y3 and adapter – still nothing. Then I began checking out the power transformer – though I thought I had done that, as I usually do, before beginning restoration. I was quite surprised to see that there was no continuity from either side of the high-voltage winding to ground.

That was odd, I thought. Even a burned-out winding ought to have one side with continuity to ground. That was when I decided to look at the schematic and all became instantly clear. I had forgotten about the send-receive switch, which is wired between the transformer high-voltage center tap and ground. I looked, and sure enough it was in the "send" position – breaking that connection.

After laughing at myself for a moment, I switched to "receive" and tried again. This time, the radio exploded into life practically immediately – almost as if it had been waiting for the fool of a restorer to get his act together. I could hear lively atmospheric static right away, and when I began to tune across the broadcast band, I heard several loud stations with no antenna whatever.

We'll do the alignment and an in-depth performance assessment next time. See you then!

Perseus Software Defined Radio
A Whole Universe of Listening Possibilities

By Larry Van Horn, N5FPW, MT Assistant Editor

Over my lifetime as a radio hobbyist, it has been fun to watch technology advance to change the equipment I use to monitor radio signals. When I started as a hobbyist over four decades ago, vacuum tubes ruled the day. But we have long since left those days behind, with the development of digital logic circuits.

As the personal computer has evolved and become more powerful, it has now become a major agent of change in the radio world. Add a PC in the shack and radio listening enters into a whole different universe. It is sometime a bit hard to believe that we now have high performance radios that weigh 13.4 ounces and fit into a box that you can hold in the palm of your hand. Today, the tools we use to extract signals from the ether almost boggle the mind.

While I consider myself an advanced user of digital technology and I embrace this technology at all levels, I wasn't quite ready for the performance and capability that I discovered when I flipped on the power switch of the Perseus Software Defined Radio (SDR) from the Italian company Microtelecom.

❖ SDR Basics

When most radio hobbyists think of SDRs, we think about a device that starts with conventional front-end hardware – a filter and/or preselector, followed by a radio frequency (RF) preamplifier and finally a stage that converts the RF signal to in-phase (I) and quadrature (Q) signals at audio frequencies. These baseband audio signals are then fed to a computer sound card that samples and digitizes them, making the resultant data signal available to be used by sophisticated software.

The Perseus SDR is somewhat different.

MT FIRST LOOK RATING (0-10 SCALE)

Audio Quality - . Dependent on computer/ speaker system used
Audio Levels ....- Dependent on computer/ speaker system used
Backlight/Display - Dependent on computer system/monitor used
Dynamic Range 1 0
Ease of Use 8
Feature Set 9
Keyboard/Button/Control Layout........... 9
   (on screen layout)
Overall Construction 10
Overall Reception 9
Owners Manual 4
Sensitivity... 9
Selectivity... 9

Overall rating: 4 and 3/4 stars

★ ★ ★ ★ ★

MANUFACTURER SPECIFICATIONS

- Frequency coverage: 10 kHz – 30 MHz
- Modes: SSB, CW, AM, S-AM, RTTY, FMNB, DRM, User (software defined)
- Sensitivity: 0.49 uV (SSB, S+N/N= 10 dB, preamp on, dither off)
- Selectivity: Software defined (>100 dB stop band attenuation)
- Image rejection: 90 dB
- Input IP3: 31 dBm
- Dynamic range (IMD3) (CW): 102 dB @ 7.050 MHz, 2 kHz spacing 100 dB @ 14.150 MHz, 2 KHz spacing
- Blocking dynamic range (CW): 124 dB (CW, dither off) (SSB): 117 dB (SSB, dither off)
- Minimum detectable signal (CW): -125 dBm -129 dBm (preamp on, dither off) -131 dBm (preselector off, preamp on, dither off)
- Minimum detectable signal (SSB): -118 dBm -122 dBm (preamp on, dither off) -124 dBm (preselector off, preamp on, dither off)
- Input clipping level: -3 dBm (preamp off), -6 dBm (preamp on)
- Attenuators: 0, 10, 20, 30 dB
- RF Preselection filters bank LPF filter: 0-1.7 MHz. BPF filters (1.7-30 MHz): 0-1.7, 1.7-2.1, 2.1-3.0, 3.0-4.2, 4.2-6.0, 6.0-8.4, 8.4-12.0, 12-17, 17-24, 24-32, Off (0-40 MHz wideband mode)
- PC Interface: High-speed 480 Mbit/s USB 2.0 port
- DDC Output sampling rate: 125 ks/s (kilo symbols per second), 250 ks/s, 500 ks/s, 1 Ms/s (mega symbols per second), 2 Ms/s 24 bit/sample IQ
- DDC Output bandwidth: 100/200/400/800 kHz (>120 dB alias rejection) 1600 kHz (> 110 dB alias rejection)
- Antenna connector: BNC
- Power supply requirements: +5Vdc (+/-5%) at 1000 mA (wall-wart)
- Cabinet: Aluminum enclosure: 110 x 36 x 185 mm (W x H x L)
- Operating temperature range: 0-40 °C
- Frequency accuracy: +/-1 (ppm) parts per million after calibration
- Weight: 380 grams

Spec Note: All specification are measured at 14.150 MHz, with preselector on, preamplifier off, and dither on. Unless otherwise indicated the CW bandwidth was 500 Hz and the SSB bandwidth was 2400 Hz.

Note: Published specs subject to change
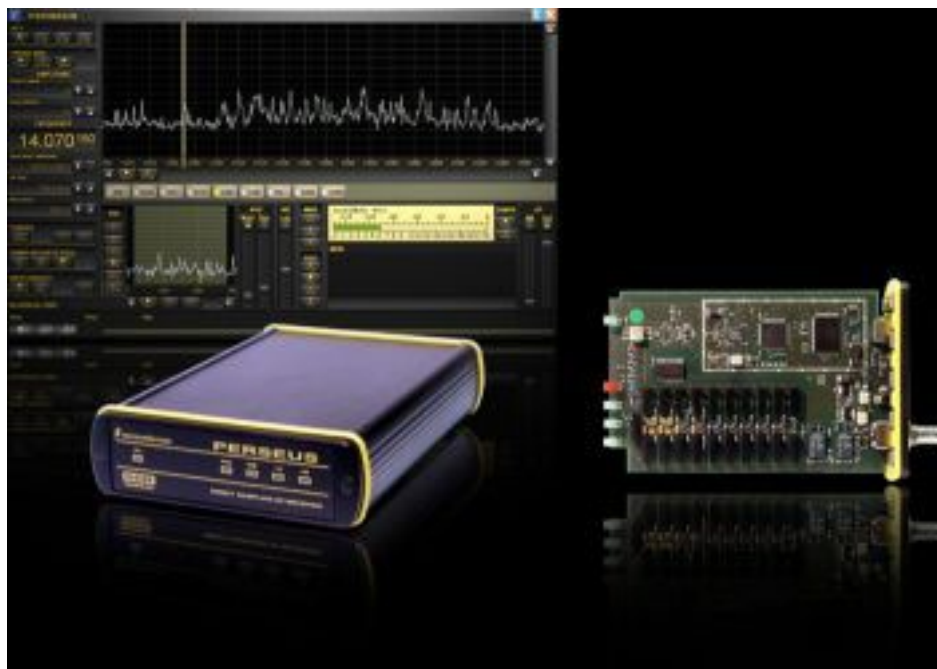
Perseus digitizes the RF the moment it leaves the front-end filters and preamplifier. It uses a high-speed (80 million samples of the signal per second) analog-to-digital converter (ADC) to convert the RF to data. In the next stage of the receiver, a field programmable gate array (FPGA) is used to create the IQ information that is streamed to the computer via a USB for processing.

The big benefit of this type of SDR methodology is that reception isn't dependent on the quality of the soundcard installed in the computer. Typical SDRs use the soundcard as the analog-to-digital converter. If you have a mediocre soundcard, your results will be mediocre. The high performance hardware used by the Perseus handles the IQ in the receiver and passes it to the receiver via a USB port. Thus the soundcard is relegated to driving the received audio to the computer speakers and is not part of the receiver's hardware.

❖ Inside the Box

I have always heard the old adage that "good things come in small packages." My first reaction after I picked up the box was, "This is a thousand plus dollar receiver in this small box?!" It has only a 1.4 x 4.3 x 7.3 inch footprint. But those looks are very deceiving. The Perseus is a full featured communications receiver unlike any other I have ever used.

In the box you get the radio, a light weight 5 VDC wall-wart, a USB cable, a CD-ROM with the radio's software/USB drivers/26 page pdf manual, and an antenna PL-259 to BNC adapter.

What I didn't find were any quick start instructions. This was a bit of a disappointment. So if you are just getting started with Perseus, your first step is to put the CD in your computer's CD tray and load the manual. Be sure to print out the pages that describe the installation, and you will do just fine.

After performing the above, installation was a snap. System power-up and the loading of the virtual control panel on my laptop went just fine.

❖ Operation

Tuning is probably the most important function in any receiver. There are many ways to tune the Perseus SDR:

1) Frequency Pane - "mouse over"
2) Frequency Pane - "direct entry"
3) Center Frequency step
4) Frequency bar - "dragging" or "mouse over"
5) Secondary Bandwidth window and the many adjustments within
6) Main Spectrum / Waterfall screen - "mouse over" and "mouse click"

What I missed the most with this receiver was a tuning knob like you have on the WinRadio's virtual control panels. I find this lack of a tuning knob a bit of a drawback. Tuning using the "mouse over" technique takes some time to get used to. I found it somewhat cumbersome to be watching the screen for signals while keeping the mouse over the frequency step I was adjusting using the mouse scroll wheel.

A quick examination of the virtual control screen reveals a plethora of control options on the Perseus. Just about any feature you would expect on a thousand dollar communications receiver is available, plus a few you don't normally see except on the really high end machines.

Perseus has pass band tuning (PBT), notch, and bandwidth controls, all fully adjustable. The bandwidth is continually variable from 25 kHz to virtually zero. The fixed buttons on the display may give the impression of fixed bandwidths only (25, 12, 6, 3, 1.6 and 0.8 kHz), but this is not so. If you hover the mouse over the shaded area within the bandwidth pane and turn the mouse wheel, you can alter the bandwidth to your needs for that particular reception. The screen even

sheet in the box. I admit I am a computer geek, but many hobbyists aren't, and a quick start sheet would be a must for those folks.

The instruction manual itself isn't among the best. A lot of the monitoring capability of this SDR isn't discussed adequately or at all. For instance, in order to take advantage of the DRM and other digital decoding capabilities, in addition to purchasing the DRM software (available from WinRadio), you will need to purchase and download a Virtual Audio Cable (VAC) program. None of this is covered at all in the manual. It took quite a bit of time reading messages on the Perseus Yahoo Support newsgroup and several Google™ searches in order to get that feature operational.

A quality, substantial antenna is a must with this radio. A whip, such as that included with a Winradio, will not make the grade. We used several antennas that we had available here at our BTown Monitoring Post and the Perseus delivered great performance with all of them. When we tried to reduce that denominator using lesser antennas, receiver performance definitely went by the wayside.

One of the major drawbacks I see today with these radios is the lack of built-in decoders for the more popular digital modes. Decoders for such modes as RTTY, PSK31, Fax, etc. would be a welcome addition, would not add significantly to the cost of the radio, and would get around some of the problems I see in using virtual audio cables, etc. in order to explore these modes.

The Perseus Software Defined Radio (RCV57) is available from Grove Enterprises, 1-800-438-8155 (**www.grove-ent.com**), for $1199.00 plus shipping. DRM software is available from WinRadio (**www.winradio. com/home/download-drm.htm**) for $49.95, and the key to unlock the software is sent via email once purchased. The Virtual Audio Cable software is also available via the Internet at **http://software.muzychenko.net/eng/ vac.html** for $30.00.

Overall, if you are looking for a quality, high-end LW/MW/HF receiver and have the necessary computing power and antenna farm, the Perseus SDR should be on your short list of radios you are considering purchasing. It is truly a radio that delivers a universe full of listening possibilities.

adjusts itself as you increase or decrease your bandwidth selection.

Other controls available on Perseus with which HF radio hobbyists may be familiar include an attenuator, preselection filters, preamp controls, ADC dithering to reduce spurious signal amplitudes, noise reduction/ blankers, a signal strength meter, automatic gain control, and frequency calibration – to name a few.

For me, one of the Perseus' biggest attractions is the record feature. Technology has advanced enough to enable this SDR to record a massive 800 kHz of the RF spectrum and play the file back at a convenient time, with all the desired features of the receiver still available to optimize reception (e.g. bandwidth, mode, passband tuning, etc). Perseus can record a spectrum bandwidth of 800, 400, 200, or 100 kHz. This is selected via the sampling rate buttons. The sampling rate buttons actually select the sampling rate at the output of the receiver's digital down converter.

If you use this feature, imagine taking the night off, but still recording for later playback the signals received in a portion of one of the tropical shortwave bands or in a slice of mediumwave spectrum. It's a neat concept to DX while you are getting some rack time – "in bed" DXing. And, you can listen as often as you like to different signals within the recorded segment, as if DXing for the first time.

The other major plus of the Perseus is the spectrum/waterfall display. This is a very versatile and useful monitoring aid. Unlike other displays that I have used which aren't as useful due to slow scans, the Perseus spectrum display is lightning fast. Add in a waterfall display (PSK31 operators are familiar with this display), and you have a powerful monitoring tool.

❖ Overall Rating and Final Thoughts

By now, you have probably figured out that I like this receiver. It was fun to play with and there is a lot more to cover than I have space in this review. But, like other radios I have tested, nothing is perfect.

As mentioned previously, Mircotelecom should really include a Quick Start instruction

System Computer Requirements
- 2 GHz Pentium IV CPU with 512 MB RAM (for 125 ks/s, 250 ks/s and 500 ks/s)
- 2.5 GHz Dual Core CPU with 512 MB RAM (for 1 Ms/s operations)
- USB 2.0 High-Speed (480 Mbit/s) port
- 16 bit AC-97 compatible audio board
- 1024 x 768 minimum resolution video board and monitor
- Two button mouse with wheel
- 10 GB or more internal hard-disk
- Supported OS: Windows 2000 SP4, Windows XP SP2, Windows Vista

Note: The Perseus receiver may operate on machines with a lower specification, but performance cannot be guaranteed.

COMPUTERS & RADIO

Shortwave QSOs -
No License or Equipment Required

Many years ago, in the dim and distant past of the early 1960s, I obtained my ham license. My call of WB2DUL was then constantly heard in the Northeast USA. I stayed up for days and worked contests. I watched for signs of sporadic E-layer skip on the TV and ran to my rig to work stations all over the USA, Canada, Caribbean and even Europe! It was an exciting adventure, especially for a thirteen year old.

DX, Rag chewing and QSOs were my passion. That was until I discovered cars and girls, in that order. The twenty-five foot Telex beam on my family's roof got progressively less use as the years went by. But radio, in some form, either professional or hobby, has stayed part of my life through the years. Hunting for unique or useful radio software has been a constant activity of mine over the past twenty years.

❖ Fast Forward 2009

If you saw Larry Van Horn's summary of radio programs a few months ago, you'll realize that over 90% of those programs were first reviewed in this column! Boy, do I feel old and so do my typing fingers. But the search continues, and this time it has yielded *Hamsphere*.

A few months ago I downloaded it for later evaluation. Well, today I installed and ran Hamsphere and was very impressed. That's not something that is easily done to Catalano after almost twenty years of *C&R* columns. Come with me as I run Hamsphere for the first time.

❖ Ham-What?

Although its name implies that it is just for ham, don't believe it. Hamsphere is for anyone, licensed or unlicensed, who wants to experience ham radio-type communications. Live voice conversations with other operators around the world (QSOs), digital data signal transmission and reception capabilities (e.g. PSK31), propagation effects on "signals," and even annoying shortwave noisemakers, such as the infamous Woodpecker – all are part of Hamsphere. Only a PC and Internet connection are required. No transmitter. No receiver. No antenna. In fact, Hamsphere doesn't even use shortwave radio waves! So what is it? Let's give it a try and see what this Ham-thing is and is not.

HamSphere is available free from its website, **www.hamsphere.com/**. However, it required me to enter my name, location, a callsign (either real or made-up) and a password before it would allow me to download Hamsphere. I
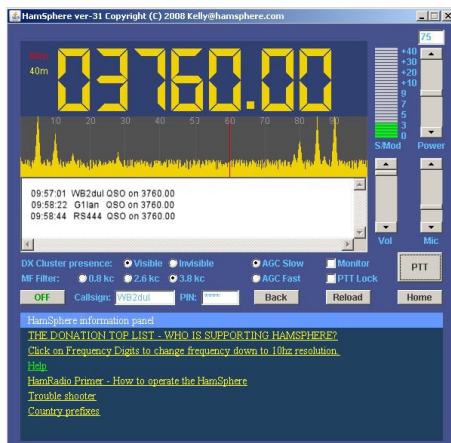
Figure 1 – The Hamsphere "Transceiver" Version 31. Here WB2DUL is in QSO with G1LAN and RS444 on 3760.00 kHz – very believable.

dutifully followed the instructions and saved Hamsphere to the folder where I keep potential programs for future *C&R* columns. With this month's column deadline fast approaching, I clicked on the Hamsphere install program, wondering what I was about to experience.

❖ What Do You Need?

HamSphere's web page gives little information on the minimum hardware that is requires. It runs on Windows, MAC and Linux, and a 128 Kbit per second Internet connection is needed. I ran it on my Radio Friendly PC (RFPC) which has a Atom 230 1.60 GHz processor running Windows XP Home Edition SP3, with a bus speed of 533 MHz, 160G SATA hard drive, 2 Gig DDR2 RAM, DVD/CD writable drive, Realtek ALC662 audio sound ports, and a video port using the Intel Graphics Media Accelerator 950. The RFPC is available from **http://HCSS. webs.com/apps/webstore/**.

❖ Operational in Seconds

Within thirty seconds a display similar to Figure 1 appeared. After entering my call sign and password, and clicking the "On" icon, I began tuning around the "80 meter band" as seen in Figure 1. Hamsphere has a number of tuning methods. I instinctively started turning by clicking on peaks as shown in the spectrum display.

When I tuned around, the signal sounded just like shortwave. It was so real, that I went back and re-read the Hamsphere info to make

sure I was not remotely accessing an on-air radio.

When I clicked on the peak at 3760.00 kHz, voices began to emanate from the speakers. Live people? Could that be? What exactly was I monitoring?

A QSO was in progress between two fellows, Dave G1LAN in the United Kingdom and Robert RS444 in Tasmania, Australia. Remember, less than a minute had passed since I began running the program for the first time. I couldn't believe how quickly and easily Hamsphere loaded and ran, or what I was now hearing. They were discussing a picture of an F-16 aircraft that Robert had just sent over the "air".

❖ It's Alive!

The real test would be if I could communicate with these disembodied voices. So I waited for a lull in between transmissions, "reading the mail" for a few minutes. Then with my best broadcast/lecturing voice I clicked on the PTT (push to talk) button shown on the right of Figure 1. Feeling more than a bit stupid, I began speaking into the microphone connected to my PC. "Break Three Seven Six Zero Kilohertz. WB2DUL is standing by on frequency." Well, at least I sounded like I was really working the ham bands. Now what?

Within seconds of releasing the my PTT icon, G1LAN came back with, "Go ahead breaker on this frequency." Holy Cow! It really felt like I was back in the saddle of ham operation. I replied, a bit shocked, with my handle (John) and QTH as USA, near Boston. Then I handed it back to G1LAN. For the next twenty or so minutes Dave, Robert and I had a good old friendly QSO. We swapped our local weather conditions and "band conditions." The whole experience was so ham-like that I had to remind myself that I was not on a real ham rig.

Just for fun, during the QSO I "fired up" my laptop, which is connected wirelessly to the Internet. Then I continued the QSO using my Windows Vista laptop running Hamsphere. Now I really was talking over radio!

❖ Back to the Future

The whole experience was great! I actually felt the same excitement of making my first ham contact that I had experienced over forty-six years ago.

Hamsphere is not simply a virtual radio using voice over the Internet. Instead, using
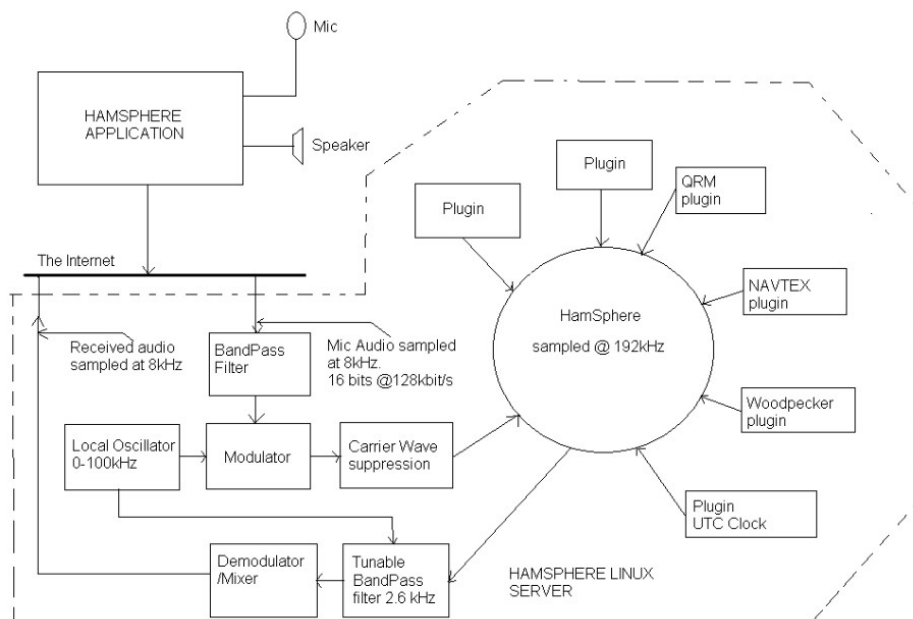
ionosphere modeling, it simulates the signal conditions that would exist between stations. Skip, signal fading, QRM (interference from other signals), QRN (interference from ionospheric noise) and multipath phase effects (echos and signal delays) can all be experienced during Hamsphere QSOs.

As Hamsphere says, "The system follows the ionospheric laws of radio wave deflection, but the rules can be bent – just a little." I'm sure they have been "bent," since making a contact with Tasmania from the northeast USA was never so easy. But I did notice a distinct difference in signal levels and stability between the UK station and the Australian.

❖ The "Radio"

The program has the feel of a typical computer-controlled radio. Figure 1 shows our 40 and 80 meter "transceiver," which incorporates double sideband modulation, a microphone compressor and variable power level. The VFO can be tuned in 10 Hz increments via arrow keys, clicking on the digits or clicking the spectrum display.

The controls are quite self-explanatory, and clicking on a function usually controls that function. For example, clicking on the "80m" label at the top left of the screen changes the band to 80 meters. Shortcut keys can also be used to control functions. Their operation is displayed by clicking on Help in the lower window. A simple, but useful Install Instruction and Troubleshooting file is available on the website by selecting the "Install Instructions."

On the same list you will find the "HamRadio Primer," which is an excellent guide to ham radio communications procedures, methods, etiquette, formats, abbreviations and Q-Signals. I suggest that ALL non-hams give this a read BEFORE they venture into a QSO. For example, each band has a fixed calling frequency. Once communication has been established, then the parties move (QSY) to another agreed frequency and continue their conversation. It is the use of these procedures and methods that contributes

another dimension of radio realism to Hamsphere.

❖ What Makes It Work?

Figure 2 shows the Hamsphere network. Here you can see that radio really has nothing to do with its operation. A Linux server is the heart of the network and interfaces all the various inputs. Notice the plug-ins for NAVTEX, QRM, Woodpecker, and UTC clock. These add elements to realism to the Hamsphere experience.

Looking at the top left of Figure 2 we can see the "Application" which we are running on our PC as a radio transceiver. "Signal" output from the application is sent via the Internet to the Bandpass section of the Hamsphere server. Simultaneously, our PC application receives "signals" from the "stations" on the Internet.

Think of Hamsphere as a big, on-line computer network that has live voice over Internet audio, mixed with channels of "canned" radio chatter, noise, and adjacent channel interference. Then the whole mixture is modulated by the signal level and stability predictions of the propagation simulator. Very creative.

❖ Digital Applications

If you remember, G1LAN and RS444 were swapping photos using EasyPal. This is a free program available at **www. kc1cs.com/**, which we did not try. Instead, we tried a decoder program called Airlink Express. This is yet another excellent free program that can be downloaded at **www.**

airlinkexpress.org/. It has very modest hardware requirements of a Pentium II 233 MHz or better running Windows XP or Vista.

We used Airlink to decode a PSK31 "signal" we found at 3728 kHz. It turned out to be a Hamsphere system-generated signal, transmitting the instructions for using Hamsphere on an endless loop. Figure 3 shows Airlink Express decoding this signal. The two programs worked together without a problem. We may return to Airlink in a future column and do a more thorough review of its capabilities.

❖ My Two Cents

Hamsphere is not a radio, but a simulator that feels and acts like the real thing! It is incredibly simple to install and use. It's fun, exciting and entertaining. In short, it's a great "radio" application. If you are a ham, or ever wanted to be a ham, give Hamsphere a try. Download it at **www.hamsphere.com/**.

The terrible shortwave band conditions we have experienced over the past few years have been no fun. Using Hamsphere reminds us what the shortwave bands were before this long dip in solar activity. And how they will again be one day…hopefully soon. Till then, we can stay in practice with Hamsphere.

Although Hamsphere is free, donations are always welcome. It takes about $6 a day to keep its server operating. Donations via PayPal are critically needed and easy to do via the "Donate" box on its website. Because of the uniqueness and quality of Hamsphere, I felt compelled to make a tiny donation to keep it running for a day. I hope after you give it a try, you will feel the same way. Without our support, excellent free programs such as Hamsphere and Airlink may cease to exist. That would be a loss to the world of radio.

And now, let's see who's monitoring…CQ CQ CQ
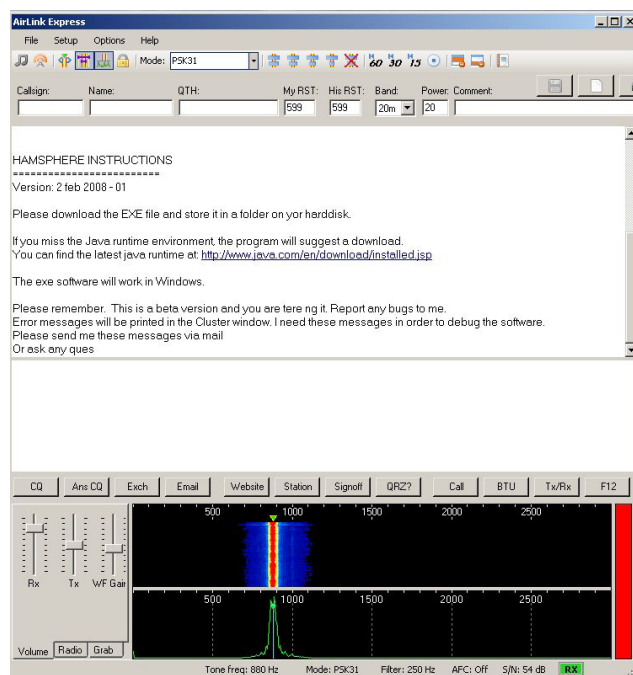
Domestic Broadcast Survey

September begins the DX season for active HF radio listeners. High static levels are subsiding, and the lure of hearing distant shortwave stations in the lower shortwave broadcast frequencies has the die-hards returning to the dials.

The Danish Shortwave Listener's Club International, a radio club of experienced international DXers, has released their 11th annual *Domestic Broadcasting Survey* to coincide with the start of the DX season. Edited by Anker Petersen, Chairman, this excellent annual publication is divided into four parts:

Part 1 begins with the Tropical Band Survey, covering all active broadcasting stations, listed by frequency from 2300-5700 kHz.

Part 2 includes Domestic stations on international shortwave bands above 5700 kHz and broadcasting to a domestic audience.

Part 3 lists all Active Clandestine shortwave stations with schedules and identifications.

Part 4 is a compilation of frequencies between 2 and 30 MHz which have not been reported by the listening shortwave audience during the past five years, but which may possibly return.

Parts 1-3 also list the station identification, slogans if known, broadcast schedules, and any parallel frequencies heard.

The *DBS* is based upon numerous sources from hobbyists, DX bulletins, and the current A09 frequency schedules when available. Throughout the year, hobbyists monitor thousands of frequencies to ensure the frequencies are listed accurately. In the listings, the right-hand column is called the "Last Log," listing the last month and year the station was heard prior to the *DBS* deadline.

All buyers of the *DBS-11* will receive a username and password, giving them access to the monthly updates on the tropical bands. These updates are published under the title *Tropical Monitor* and are posted on the club website at **www.dswci.org**

The new 35-page 11th edition is available by email in the Adobe PDF format (about 452 kB). The electronic edition costs: DKK 40,00 or USD 8.00 or Euro 5,00 or GBP 5,00 or SEK 60,00 or 5 IRCs. A limited number of copies are available in printed format. The printed edition costs: DK 80,00 or USD 16.00 or EUR 10,00 or GBP 10,00 or SEK 120,00 or 9 IRCs.

Funds should be addressed to: Bent Nielsen-Treasurer, Egekrogen 14, DK 3500 Vaerloese, Denmark. Payments by cash notes are accepted, but checks and postal money orders are not. DSCWI bank is Danske Bank, 2-12 Holmens Kanal, DK-1092 Copenhagen K. If you are using Pay-Pal or a Euro as national currency, please contact Andreas Schmid, Le-rchenweg 4, D-97717 Euerdorf, Germany.

The *Domestic Broadcast Survey 11th edition* is an excellent source for shortwave broadcast hobbyists who want to follow the changing world of shortwave radio. This edition, as well as previous ones, will become a permanent part of my reference library and the current edition is always within easy reach as I tune the shortwave spectrum. I highly recommend the *DBS* to DXers seeking the "extra edge" when it comes to listening to domestic shortwave broadcasts.

– Review by Gayle Van Horn, W4GVH.

HAMCALC v110 Now Available

HAMCALC "Painless Math for Radio Amateurs" Version 110 was released June 22, 2009. It contains over 350 programs – a far cry from version 1, released in 1993, which contained 12 programs!

HAMCALC is free from R.F. engineering software by George Murphy, VE3ERP, and it is used worldwide as a design, reference, and teaching tool by radio amateurs, professionals, and educators since its introduction in 1993.
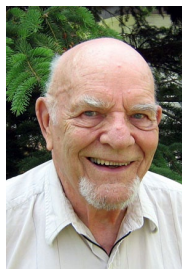
Most of the programs can be run in either Metric or Imperial/USA units of measure. Hamcalc contains a lot of information not readily found in current popular handbooks and literature. The program is easy to install, use, and understand by non-technical hobbyists.

A hard drive is required for the installation of HAMCALC. Once installed, it can be run in WINDOWS or MS-DOS. HAMCALC is written in GWBASIC, but does not require MS-DOS to run. GWBASIC.exe is a stand-alone file that runs in WINDOWS and MS-DOS operating systems.

HAMCALC is no longer available on CD, but authorized copies can be downloaded for free (1.5Mb zip file) from the internet at **www.cq-amateur-radio.com**. Click on HAMCALC at the bottom of the left side of the *CQ* magazine home page.

Argos3Plotter

With the advent of more powerful PCs now available to radio hobbyists, digital decoding software has made a gradual shift from hardware based decoders to software decoding packages that use the computer sound card.

One of the best kept secrets on the web for digital decoding software is the suite of software packages available from the COAA (Centro de Observação Astronómica no Algarve) in Portugal. The author of these programs is Bev M. Ewen-Smith.
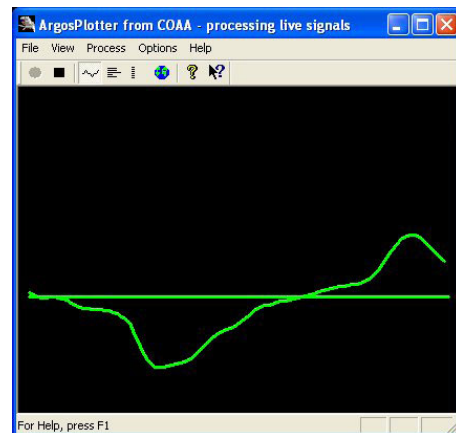
Bev has released a brand new program for decoding the Argos-3 satellite downlink digital streams.

The Argos-3 system collects terrestrial data from remote locations, including automatic weather stations, drifting oceanographic buoys, and wildlife tracking. You can use a simple UHF radio receiver (scanner) tuned to the 459.9875MHz downlink frequency to pick up the strong signals from these satellites.

With the new Argos3Plotter software you can decode the downlink telemetry and find out the positions of the satellites, their operational status, and monitor the command messages sent to the remote data collection platforms.

Argos3Plotter decodes transmissions from the Argos-3 systems on board the NOAA and Metop satellites using the sound card in your PC. You need a suitable UHF band radio receiver tuned to the Argos-3 telemetry channel. The program decodes the received digital data and displays and logs the messages.

There are five modes available within the Argos3Plotter software:

Signal mode -
In Signal Mode, Argos3Plotter displays the raw digital signals on your PC screen in a diagnostic display which helps you to set up the system and adjust the receiver.

Message mode -
In Message Mode, Argos3Plotter displays each decoded message in plain language on your PC screen. It displays the ephemerides, the status reports, the time codes, the downlink coded messsages, and the acknowledgements to the uplink messages from the data collection platforms.

Satellite mode -
In Satellite Mode, Argos3Plotter displays the current location, azimuth, elevation, range, and Doppler shift of those satellites for which an ephemeris message has been received.

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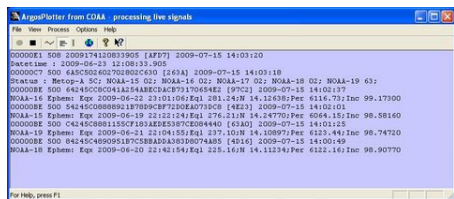
Chart mode -

In Chart Mode, Argos3Plotter charts the current location those satellites for which an ephemeris message has been received.

Message log -

Argos3Plotter stores all messages received and decoded in a text file for later analysis and review. The log file is time stamped.

Computer requirements to run Argos3Plotter are a Pentium level PC running Win95/98/Me/2k/XP/Vista with compatible sound card, a UHF band radio receiver with NFM mode. The receiver must be tuned to the Argos telemetry channel 459.9875 MHz. The receiver audio output must be connected to the Line-In connector on your PC. Because Argos downlink messages are transmitted on UHF, the satellites must be within line of sight of the receiver in order for the signals to be received.

The Argos3Plotter program can be downloaded freely and comes in a self-installing exe file. The file size is a modest 400 kb. Version 1.8 is available now and can be used for 21 days. After that time it must be registered. Registration is quick via an on-line secure website. Argos3Plotter costs only Euro _25 (plus VAT for EU residents) for personal use. I strongly recommend that you ensure that Argos3Plotter performs to your satisfaction before registering.

Some of the other software packages available from COAA include: Ship Plotter (VHF AIS decoder); Plane Plotter (works with ACARS, ADS-B, and HFDL decoding software, not included); Train Plotter (UIC protocol); DSCdecoder (Digital Selective Calling and DGPS beacon decoding); NDB-finder (NDB decoder); EpirbPlotter; Orbcomm satellite telemetry decoder; SondeMonitor (radiosonde balloon telemetry decoder); Combi-Plotter (combines the ShipPlotter, PlanePlotter, OrbcommPlotter and SondeMonitor decoders into one package); and several other interesting software packages.

You can get more details on all these software packages, including registration information at **www.coaa.co.uk/software_signals.htm**.

Multipsk to add Mil-Std 188-110A

Fans of Multipsk will be happy to know that Patrick, F6CTE, developer of the program, is in the process of adding the Mil-Std-188-110A serial modem mode to the popular decoding software. This mode will become part of the professional package and not the freeware version.

Mil-Std 188-110a is a mode commonly used by various military services, including the US Department of Defense services, US Coast Guard, the Chinese military, Mexican Navy, Swedish Navy, the Australian ADF-HFCS, Austria Navy, Swiss diplo nets, Georgia military, Venezuela Army/Navy, and the Spanish Navy to name a few. Since the Skysweep software is going away in the near future, this is very welcome news. Patrick's program continues to evolve and is very reasonably priced to get the professional modes.

You can learn more about the Multipsk family of software at

http://f6cte.free.fr/index_anglais.htm

VoIP: Internet Linking for Radio Amateurs, 2nd Edition

Through a technique called Internet linking, ham radio operators are harnessing the im-

mediacy and portability of radio communication to the global reach of the Internet. Today's radio amateurs are using the Internet as the relay between their radio base stations, handhelds and mobile transceivers for long-distance communication, spanning thousands of miles.

The ARRL has released a second edition of *VoIP: Internet Linking for Radio Amateurs*, the complete guide to several of the most widely used Voice over Internet Protocol (VoIP) systems used by today's radio amateurs, with particular attention to EchoLink and the Internet Radio Linking Project (IRLP).

The book is designed for beginners, as well as those hams who are long-time VoIP users. If you're new to VoIP, you'll discover information on how to get started setting up and using these systems. The more advanced ham will find plenty of technical "meat" to dig deeper into VoIP applications and discover how they actually work.

Contents in this new edition include chapters on:

- Connecting the World
- Using a VoIP Link
- Conference Servers, Reflectors and Nets
- Other Linking Systems
- Setting Up Your Own Node
- Digital Audio and the internet
- Under the Hood: EchoLink
- Under the Hood: IRLP
- Legal Issues in Linking
- Web Resources & Glossary

Two new chapters have been added to this edition. Chapter 9, titled "Asterisk and app_rpt," covers the new Asterisk PBS software and its use, set-up, and hardware to run it. Chapter 10 on "Remote Control Techniques" covers the two basic operations that are allowed in FCC Part 97 rules governing amateur radio.

Written by EchoLink creator Jonathan Taylor, K1RFD, *VoIP: Internet Linking for Radio Amateurs*, ARRL product 1431, is available for $21.95 plus shipping from the ARRL Web site and amateur radio stores.
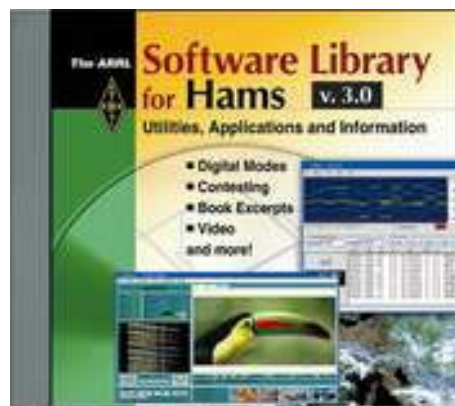
The ARRL Software Library for Hams v3.0

If you are into computers and using them in the ham shack, you will certainly appreciate a new CD-ROM from the ARRL. The ARRL Software Library for Hams 3.0 provides the user quick access to utilities, applications and information.

Some of the contents on this new CD-ROM include:

- Book excerpts and videos
- Contesting software, including N1MM Logger
- DX Bulletin Reader
- Weather satellite software
- HF digital software for PSK31, MFSK16, MT63, RTTY and more
- WSJT software for meteor scatter and moonbounce and more

The content on this CD-ROM is divided into folders which contain software for a variety of ham radio applications. You'll also find programs for APRS, packet radio, and satellite tracking. Plus, handy software tools for calculating transmission line loss, creating custom DSP audio filters, and more. Bonus files include ARRL screensavers, audio samples, video files, and PowerPoint presentations.

Minimum system requirements to run the CD include a 400 MHz Pentium PC with 256 MBytes of RAM and Microsoft® Windows® XP or Windows Vista. (Note: The included CWDecoder application will not function under 64-bit versions of Windows XP, or on Windows Vista.). A sound card is required to listen to sound samples or use the sound-card-based digital communication software. Includes the free Microsoft® PowerPoint® viewer. It should be noted that the ARRL does not support the software in this collection. For support questions you will have to contact the program authors directly.

This new version on CD-ROM, ARRL product 1424, sells for $19.95 plus shipping.

You can order all ARRL publications from the ARRL, 225 Main Street, Newington, CT 06111-1494. Order Hotline 1-888-277-5289 (toll-free US only), Monday through Friday, 8a.m. to 8p.m. Eastern Time. You can also order online at **www.arrl.org**.

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Foreign International*	❏ $30.95*	❏ $58.95*	❏ $119.95*	❏ $179.95*
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MT: AMERICAN BANDSCAN
http://americanbandscan.blogspot.com/ - by Doug Smith

MT: FED FILES
http://mt-fedfiles.blogspot.com/ - by Chris Parris

MT: MILCOM
http://mt-milcom.blogspot.com/ - by Larry Van Horn

Larry's Monitoring Post
http://monitor-post.blogspot.com/ - by Larry Van Horn

MT: SHORTWAVE
http://mt-shortwave.blogspot.com/- by Gayle Van Horn

MT: UTILITY WORLD
http://mt-utility.blogspot.com/- by Hugh Stegman

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